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97th Congress }
2d Session }

JOINT COMMITTEE PRINT

FISCAL YEAR 1983 ARMS CONTROL IMPACT STATEMENTS

Statements Submitted to the Congress by the President Pursuant to Section 36 of the Arms Control and Disarmament Act

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FOREWORD

This document contains the fiscal year 1983 arms control impact statements (ACIS) as submitted to the Congress by the Reagan administration in compliance with section 36 of the Arms Control and Disarmament Act.

When Congress enacted this reporting requirement in 1975, it envisioned that the ACIS would enhance both executive branch and congressional decisionmaking regarding the potential impact of defense and nuclear programs on arms control policy and negotiations.

Submission by the Reagan administration of its first ACIS along with the fiscal year 1983 defense budget request, as required by law, is recognized and appreciated by Congress. This timely submission should make an important contribution to Congress' consideration of the Reagan administration's recently-announced strategic modernization program. Two of the major elements of this $180 billion nuclear modernization effort—the Trident submarine, and the MX missile—are analyzed in the fiscal year 1983 ACIS.

As part of the congressional consideration of the executive branch's fiscal year 1983 defense budget request, our committees will carefully scrutinize the quality of the corresponding ACIS to assure that they provide meaningful arms control analysis of major weapons programs as originally envisioned by Congress.

This year's joint committee print contains two additions, first included in last year's report, which have enhanced the utility of the ACIS for congressional use: a digest of the arms control impact statements prepared by the Congressional Research Service; and a glossary of pertinent terms and acronyms.

We believe that ACIS reinforces the importance of congressional and executive branch cooperation on matters of critical importance to our national security and thus look forward to continued compliance with the requirements of Public Law 95–338 in future years.

The views and analysis expressed in the following arms control impact statements are those of the executive branch and not necessarily those of the members of the Senate Committee on Foreign Relations or the House Committee on Foreign Affairs.

CHARLES H. PERCY,
Chairman, Committee on Foreign Relations.

CLEMENT J. ZABLOCKI,
Chairman, Committee on Foreign Affairs.

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LETTER OF SUBMITTAL

U.S. ARMS CONTROL AND DISARMAMENT AGENCY,
OFFICE OF THE DIRECTOR,
Washington, D.C., February 8, 1982.

Hon. GEORGE BUSH,
President, U.S. Senate.
Hon. THOMAS P. O'NEILL, Jr.,
Speaker of the House of Representatives.

DEAR MR. PRESIDENT: On behalf of the President, I am submitting the fiscal year 1983 arms control impact statements pursuant to 22 U.S.C. 2576, as amended. Classified and unclassified impact statements are submitted as required by the statute.[1] I am also submitting abbreviated statements for those programs that meet the statutory criteria for arms control impact statements but which have not received in-depth analysis for the reasons indicated.

The fiscal year 1983 budget cycle marks the seventh year in which arms control impact statements have been submitted to the Congress. As in previous submissions, some statements describe alternative points of view about arms control effects. The inclusion of any particular viewpoint, therefore, should not be understood to imply its endorsement.

The programs described in the enclosed arms control impact statements are designed to strengthen our own and allied forces and to demonstrate to the Soviet Union that we are resolved to meet the challenge of their sustained and massive armament programs and their excessive reliance on military force and intimidation. These programs are essential to the development or maintenance of the United States military strength necessary to achieve a military balance with our principal adversary, to deter aggression, and to support and enhance international stability. The programs will permit us to pursue arms control objectives in a way which will enhance our security.

The Administration has concluded that all of the programs analyzed in the fiscal year 1983 budget are consistent with the terms and provisions of existing arms control agreements, with U.S. security and arms control policy, and with current negotiating poistions.

Sincerely yours,

EUGENE V. ROSTOW.

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[1] The classified version is retained in committee files. This publication is the unclassified version in its entirety.

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CONGRESSIONAL RESEARCH SERVICE DIGEST OF FISCAL YEAR 1983 UNCLASSIFIED ARMS CONTROL IMPACT STATEMENTS [1]

Introduction

The arms control impact statements (ACIS) for fiscal year 1983 consist of 11 in-depth documents and two compilations of abbreviated ACIS. Each in-depth ACIS is organized into six sections: (1) Introduction; (2) program description; (3) stated military requirements; (4) funding; (5) analysis; and (6) summary and overall arms control assessment. The following digests are based on the introduction, analysis, and summary sections of each ACIS and were prepared from the unclassified versions provided to the Congress by the Administration on February 8, 1982. These digests represent restatements of the language of each ACIS and do not necessarily reflect the views of the Congressional Research Service. Additional information beyond the scope of these digests is available in the unclassified ACIS published in this volume. The most complete information, especially for the ACIS on space defense programs and others that are largely deleted in the unclassified version, is available in the classified ACIS.

ICBM Programs

Maintaining and improving the capabilities of the U.S. land-based ICBM force—one of the three components of the U.S. Triad of strategic nuclear offensive forces—are necessary for deterrence, to redress an asymmetry in ICBM capabilities favoring the Soviet Union, and to maintain a balance in overall strategic forces. The decision to build the MX missile and to continue upgrading the Minuteman force takes account of the following arms control implications:

—Deployment of the MX and modifications to the Minuteman are consistent with the terms of SALT I and II, which allow modifications of existing weapons systems within specific constraints. The SALT II agreement permits deployment of one new type ICBM.

—Failure to deploy MX could lead to perceptions of Soviet advantage with the following political implications: greater Soviet freedom of action in employment of conventional forces and in the implicit use of nuclear strength for political coercion; changing perceptions of the U.S.-U.S.S.R. military balance among third countries, thus affecting U.S. foreign policy; and a decrease in Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe.

—All MX deployment options under consideration address the problem of perceived vulnerability. The existence of survivable, secure U.S. retaliatory capabilities will enhance strategic stability.

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[1] Prepared by Dagnija A. Sterste-Perkins, Analyst in International Relations, Foreign and National Defense Division, Congressional Research Service.

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—Soviet perceptions of the effect of MX on the vulnerability of their overall strategic forces will determine MX's effect on stability; Soviet reliance on silo-based ICBMs for strategic warhead deployment could affect their judgment about MX. If they recognize that the U.S. program emphasizes retaliatory capability, they should find opportunities for enhancing their security through arms control.

—Deployment of mobile ICBMs—particularly a Soviet mobile ICBM—could raise verification problems for both sides. Ground-mobile schemes would require cooperative measures for adequate verification. Negotiated agreement could also help overcome these difficulties for both powers.

—Despite U.S. policy regarding START and INF arms control negotiations, many nonaligned nations criticize intensification of the U.S.-U.S.S.R. nuclear arms race on the basis of article VI of the NPT. Progress on START or in INF talks would help mitigate criticisms as well as an eventual weakening of the NPT as a preventor of nuclear weapons spread. Many important non-nuclear weapon states are U.S. allies that rely on the U.S. nuclear arms umbrella and regard modernization as essential; thus, from their viewpoint, U.S. modernization inhibits proliferation.

—A viable ABM defense of U.S. ICBMs could improve survivability and is under study. Adopting an ABM defense of the MX could require amending the ABM Treaty or withdrawing from it. On the other hand, the U.S. R. & D. program could reinforce the ABM Treaty by discouraging evasion or abrogation. Soviet ABM deployment would be economically and militarily unsound because U.S. advanced technology provides disincentives for Soviet upgrading or deployment of an ABM system around Moscow or elsewhere by reducing its potential effectiveness in preventing the arrival of ballistic missile re-entry vehicles.

SSBN/SLBN Programs

The Trident submarine, missile, and warhead programs will provide a new class of fleet ballistic missile submarines (SSBNs) and SLBMs to augment and eventually replace the present Polaris and Poseidon strategic submarines. They have the peacetime mission of deterrence of nuclear war, and the wartime missions of strategic and theater nuclear strikes, as well as deterrence of further escalation. Arms control considerations include the following:

—As U.S. silo-based ICBMs become more vulnerable, SSBNs could become more important in guaranteeing U.S. retaliatory capability and thus help to insure strategic stability.

—Because of the greater range of Trident missiles, U.S. strategic submarines have many times more available ocean operating area. Also, the improved speed and low operational noise of Trident submarines make them even more survivable against Soviet ASW then are existing SSBNs, which are already highly survivable. No pending Soviet ASW developments are likely to pose a significant threat to Trident.

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—Trident missile programs could be constrained by the terms of the Threshold Test Ban Treaty, which limits the United States and the U.S.S.R. to nuclear tests of no more than 150 kilotons.

—The increased operating room afforded by the Indian Ocean might be of future use to U.S. SSBN/SLBM forces. If a major Soviet ASW breakthrough were to imperil the U.S. ballistic missile submarine force or if the Soviets were to abrogate the ABM Treaty and make major new efforts to build ABMs, the United States might require Indian Ocean launch points to complicate Soviet defenses. Any serious consideration of the Indian Ocean as a "Zone of Peace" or a "Nuclear Free Zone" must consider this potentiality.

—Deployment of Trident II missiles would complement other programs designed to compensate for U.S. fixed ICBM vulnerability and would provide a hedge against possible vulnerability of the other legs of the strategic Triad through the 1990's. Trident II's survivability would enhance crisis stability because it would contribute to an enduring retaliatory force that could inflict damage across the spectrum of Soviet targets.

—Deployment of Trident II could add incentives for the Soviets to reduce their ICBM vulnerability by deploying more ICBMs at sea or in a mobile basing mode; this might enhance strategic and crisis stability. The Soviet response would depend on the speed of U.S. deployment, the cost of changes to the Soviets, and the perceived degree of threat to their silo-based ICBMs.

—SSBN/SLBM programs will not cause verification problems; numbers can be monitored by national technical means.

AIRBORNE STRATEGIC OFFENSIVE SYSTEMS

Modernization of the B–52, procurement of the B–1B, deployment of air-launched cruise missiles and development of advanced aircraft echnologies will contribute to the continued viability of the bomber lement of the strategic Triad.

—Development of cruise missiles, particularly ALCMs, will give the U.S. leverage in future START negotiations. The possibility of a major increase in U.S. strategic capabilities in the absence of SALT reductions, as suggested by cruise missiles and related force improvement programs, could enhance the chances for a balanced and verifiable agreement.

—B–52 avionics system upgrading, ALCM deployment, and B–1B procurement will maintain U.S. airborne strategic offensive effectiveness in the face of improving Soviet air defenses. These systems do not represent a first-strike threat against the Soviets, but their retaliatory capability enhances deterrence and contributes to strategic and crisis stability.

-U.S. ALCM deployment could lead the Soviets to respond by (1) increasing efforts to deploy a defense against cruise missiles and their associated launch platforms; (2) accelerating their development of a cruise missile capability; (3) upgrading their overall xisting strategic offensive systems. But Soviet long-range cruise nissile development would more likely be in response to Soviet nilitary requirements than in reaction to U.S. ALCM deployment. ruise missiles present troublesome verification problems; future ms control agreements will require more detailed and stringent

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cooperative measures to ensure adequate verification. In contrast with U.S. efforts to monitor Soviet cruise missile programs, the open U.S. society affords the Soviets considerable advantages in monitoring U.S. programs. The problem of verifying compliance with limits on ALCM carriers, however, is not insurmountable.

—Without offsetting adjustments in U.S. forces, a U.S. decision unilaterally to restrict cruise missile deployment and new bomber procurement would lead to U.S. strategic forces that were not capable of supporting U.S. national security objectives.

Space Defense

The Space Defense System program is developing alternative methods of destroying objects in space. The effort involves four functional areas: (1) anti-satellite systems; (2) space systems survivability; (3) space surveillance systems; and (4) command and control. Because the Soviets currently possess an operational ASAT and the United States does not, arms control policy with regard to space defense is under review.

The U.S. space defense program indicates U.S. determination not to permit a Soviet ASAT monopoly; is subject to revision depending on decisions regarding ASAT negotiations; is consistent with U.S. obligations under the Outer Space Treaty, the U.N. Charter, the ABM Treaty, the International Telecommunications Convention, the Convention on Registration of Objects Launched into Outer Space, and the Direct Communications Link Modernization Agreement; will not adversely affect other arms control negotiations; and is not likely to lead to third-country development of antisatellite systems.

Ballistic Missile Defense

The U.S. ballistic missile defense (BMD) research and development program is conducted within the terms of the ABM Treaty and supports U.S. arms control policy by keeping the United States abreast of BMD technologies, thereby hedging against and serving to discourage any possible Soviet breakout from the ABM Treaty. BMD research will provide the technological base from which a system to defend ICBM sites could be developed to support a Presidential decision on deployment. A deployment decision could convince a potential attacker of the pointlessness of any offensive buildup designed to produce a disarming first-strike capability against ICBMs. But ABM deployments could also stimulate an offense-defense competition, including the development and deployment of advanced penetration aids and maneuvering reentry vehicles for offensive forces, as well as increases in force levels, giving each side an incentive to further improve the capabilities of its ABM systems.

By making possible greater confidence in our understanding of the potential of BMD technologies, this program supports continued U.S. adherence to the ABM Treaty, or, if necessary, helps identify those technologies and systems for which a Treaty amendment might be appropriate. The ABM Treaty is scheduled for review and a U.S.-U.S.S.R. meeting will be held for this purpose sometime after October 3, 1982.

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Intermediate-Range Nuclear Missile Systems and the Sea-Launched Cruise Missile

The term "Intermediate-Range Nuclear Forces" (INF) was introduced as the United States prepared to begin negotiations with the Soviet Union in November 1981. The systems involved are the Pershing II (PII) and the ground-launched cruise missile (GLCM). The previous term, "Long-Range Theater Nuclear Forces," was changed to more clearly reflect the scope of the U.S.-U.S.S.R. negotiations and to dispel the idea that the United States viewed Europe as a "theater" of nuclear conflict distinct from the United States. There have been no significant programmatic changes in either the PII or the GLCM programs since submission of the fiscal year 1982 ACIS. The fiscal year 1983 discussion was included because of the high level of interest in INF.

The land-attack, sea-launched cruise missile (SLCM) will be deployed on ships and submarines to expand and strengthen U.S. worldwide sea-based forces. The physical similarities between SLCM and GLCM raise a number of related arms control issues.

—In the absence of international agreements to reduce nuclear stockpiles, there is a need to retain and modernize theater nuclear capabilities, especially those such as PII and GLCM which support NATO's strategy of flexible response. The availability of a graduated escalatory ladder enhances deterrence by raising the possibility that aggression at any one level of conflict might either be matched in kind or escalated. Deployments of PII and GLCM add a new dimension to the variety of response options below the strategic level. This helps to insure the linkage between lower response options and the strategic nuclear forces and in so doing makes an effective NATO response more credible.

—The positive effect of U.S. and NATO modernization programs on arms control negotiations has already been demonstrated in the INF talks. In the face of Allied resolve to proceed with INF deployments, the Soviets dropped their preconditions for entering into negotiations.

—The increased survivability of PII, GLCM and SLCM might allow the West to put relatively less dependence on aircraft for the delivery of nuclear weapons, thereby releasing some aircraft for conventional roles. Such increased conventional capability could aid in raising the nuclear threshold, and at the same time improve survivability and stability.

-INF modernization is directed toward lessening perceptions of gaps in the continuum of NATO capabilities and to enhance deterrence, Alliance cohesion, and stability. While there has been agreement on the need to improve INF to counter Soviet gains, there is also some resistance among the Allies to increasing NATO's INF capability owing to the fear that a Euro-strategic alance may be created which would decouple NATO nuclear orces from U.S. strategic forces.

evelopment and deployment of warheads for INF missiles and LCM would not be affected by the Limited Test Ban Treaty; e terms of the Threshold Test Ban Treaty limit the United ates and the Soviet Union to nuclear tests of no more than 150 T of explosive yield.

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—With respect to future arms control agreements, mobile systems such as the Soviet SS–20 and GLCM are likely to present difficulties for verification.

—Like any nuclear modernization program, the PII, GLCM, and SLCM programs entail political costs and carry with them important arms control implications. The United States will continue to ensure that these programs are consistent with overall national security objectives, including the development of future options for limiting strategic and theater nuclear arms to ensure deterrence and global stability.

Short-Range Nuclear Forces

Dual-capable artillery and short-range missiles, the low end of the spectrum of U.S. nuclear weapons, are an important component of NATO's military forces and deterrent posture. They support NATO's doctrine of flexible response which suggests the possibility that a conflict in Europe could be escalated in a controlled way to seek its termination. Because they are likely to be involved in war at an early stage, their deployment raises concerns which have become more prominent as a result of the controversy surrounding the reduced blast/enhanced radiation (RB/ER) feature of certain new warheads being produced for U.S. short-range nuclear systems.

—President Reagan announced on August 6, 1981, that ER weapons would be produced and stockpiled on U.S. territory. There are no plans to deploy ER weapons outside of U.S. territory.

—Effective implementation of NATO doctrine in a manner consistent with announced strategy contributes to stability in Europe, an arms control objective. Modernization of these warheads is also consistent with arms control goals in that range, accuracy, control, and security improvements represent evolutionary changes in existing weapons and are unlikely to affect significantly existing perceptions of these weapons or their relationship to U.S. arms control efforts.

—Front line deployment of these systems has caused concern because the Warsaw Pact could be tempted to attack with its own nuclear systems. However, a Soviet strike probably would be initiated upon indication that NATO intended to use nuclear weapons. If necessary a Soviet strike could be launched to achieve Soviet objectives and would target known nuclear storage sites and deployments, not just LANCE or dual-capable artillery.

—The United States is not party to any treaty or other legal obligation that would inhibit the development, production or deployment of short-range nuclear weapons. Development of these weapons is not affected by the provisions of the Threshold Test Ban Treaty.

—Failure to modernize short-range nuclear weapons could indicate to Europe a lack of U.S. resolve to use nuclear weapons, if necessary, for Europe's defense. This could weaken European incentives to strengthen conventional forces or cause them to strike on their own, if they believed that the ultimate deterrent was not credible. These modernization programs thus may be seen as demonstrating U.S. commitment, encouraging the strengthening

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of conventional forces, and therefore raising the nuclear threshold.

Fleet Air Defense Systems

STANDARD missiles are ship-launched surface-to-air missiles (SAM) intended for surface combatant defense against air-breathing threats. Improvements, such as stand-off jammer suppression, vertical launching systems, and nuclear warheads, are intended to counter new, more capable air-breathing threats to warships. Upgrading conventional fleet air defense capabilities would reduce the prospective vulnerability of fleet battle groups operating in the projected combined Soviet air, sea, and subsurface severe threat environment. By improving the U.S. Navy's capability to perform a variety of vital missions in peacetime and in war, they contribute to the deterrence of war and to international stability, hence furthering arms control objectives.

—The United States is not a party to any arms control agreement which restricts deployment of naval anti-air warfare weapons or their supporting systems. Article VI of the ABM Treaty contains a provision, included at U.S. insistence, which prohibits giving non-ABM missiles, launchers, or radar an ABM capability; the negotiating record sets forth a list of indicators for judging whether a SAM system has an ABM capability, including phased-array radar and nuclear-armed interceptors. The programs discussed in this ACIS include the first U.S. mating of a non-ABM nuclear interceptor with a phased-array radar system. The Soviets have already deployed SAMs with phased-array radars. It is in the U.S. interest for both parties to the ABM Treaty to avoid steps making verification more difficult. It is difficult to differentiate among systems intended for defense against air-breathing, tactical ballistic missiles, or strategic ballistic missile threats. To constrain U.S. programs without firm categorization criteria could result in the United States being more self-constrained than the Soviet Union in developing high performance air defense systems.

—U.S. naval forces that were only equipped with conventional defenses would present more vulnerable targets for air-launched Soviet attacks. The possibility of a U.S. nuclear response could increase Soviet incentives to exercise forbearance in the use of nuclear weapons against U.S. naval forces. Whether the use of nuclear weapons over an ocean area would lead directly to escalating the associated land campaign is unknown.

Medium-Range Air-to-Surface Missile

The medium-range air-to-surface missile (MRASM) is a conventionally armed, tactical cruise missile for both anti-ship and land-attack employment. The MRASM would provide an improved conventional capability to disrupt such activities as airfield operations, contribute toward the creation of maritime superiority required to put Soviet naval forces at risk, and to project forces worldwide. By enhancing NATO's conventional posture and U.S. capabilities worldwide, they support deterrence and regional stability.

SALT II limitations would have pertained only to air-launched cruise missiles with fuel exhaustion ranges of over 600 km;

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MRASM would not have been considered a long-range cruise missile under SALT II terms. SALT II also would have required externally observable design features to distinguish MRASMs from long-range cruise missiles; this requirement is also met by the systems under discussion. Because MRASM is medium range and conventionally armed, it should not be subject to limitation in future strategic systems negotiations. If negotiated cruise missile constraints were more severe, future arms control agreements could require more encompassing and stringent cooperative measures in order to assure adequate verification.

Chemical Warfare

The proposed fiscal year 1983 chemical warfare (CW) program includes active RDT&E of both deterrent retaliatory and defensive CW programs; procurement of an improved protective CW capability; initiation of actions needed to modernize the U.S. deterrent retaliatory capability and to dispose of the deteriorating chemical agent stockpile; and maintenance of chemical munitions. The program supports the U.S. objective of maintaining an adequate defensive and deterrent retaliatory capability, increasing the safety of the systems involved, as well as eventually concluding a complete and verifiable prohibition of chemical weapons production, development and stockpiling; and contributes to negotiations by allowing the United States to gain negotiating leverage in the area of chemical weapons arms control.

—The U.S. CW program is fully consistent with, and complementary to, the pursuit of a CW ban and the U.S. policy of no first use of chemical weapons.

—Congressional and Administration actions to construct and to equip Phase I of a binary CW production facility do not represent a decision to place greater emphasis upon CW but reflect U.S. national security policy to deter war.

—Bilateral U.S.-U.S.S.R. negotiations on a comprehensive CW prohibition stalled in 1979 over verification issues; since then, multilateral interest in CW discussions has intensified within the Committee on Disarmament.

—The Soviet Union can easily verify that the United States is actually conducting the CW programs which we openly claim.

—U.S. policy is to pursue chemical weapons arms control and to maintain appropriate military capabilities to eliminate the existing large asymmetry in U.S.-U.S.S.R. CW capabilities, until such time as effective international agreements remove existing and future threats of CW.

Directed Energy Programs

U.S. directed energy (DE) programs represent an effort to explore and, if feasibility is proven, to develop the potential of DE weapons, which would have potential mission advantages over many existing types of weapons against missiles, aircraft and spacecraft targets. While high energy lasers (HEL) and particle beams (PB) differ in state of development and in the technology required to realize them, they have potential for weapon systems of similar operational char-

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acteristics. Further, they could have similar implications for the future of the ABM Treaty, possible ASAT negotiations, and space defense issues generally.

—Research conducted to stay abreast of technologies having military potential and to gain insight into what the Soviets and others may be discovering through their own research helps provide confidence that the United States can maintain an adequate balance of forces.

—DE weapons research is not constrained by existing arms control agreements. The ABM Treaty bans the development, testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. Although the Treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams), including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the Treaty prohibits their deployment unless the Parties consult and amend the Treaty.

—DE weapons in an ASAT role are affected by the ABM Treaty, SALT I, and SALT II. These agreements prohibit the actual use of systems to interfere with national technical means used to verify compliance with strategic arms control agreements. They do not prohibit the development, testing, or deployment of systems that could be used in such roles.

—New technologies like HEL weapons could serve arms control interests by encouraging nations to negotiate with one another in an attempt to avoid waging and possibly losing an expensive weapons race. It is not possible to make a reasonable assessment of the net impact of the HEL program on future global or regional stability.

—Although the DE-related R. & D. efforts funded in the fiscal year 1983 budget have no more than marginal arms control effects now, this technology deserves continuing attention in the future.

Abbreviated Arms Control Impact Statements

As in the fiscal year 1982 ACIS, the fiscal year 1983 submission contins two sets of abbreviated ACIS: One for Department of Defense ograms and one for Department of Energy programs.

The abbreviated DOD ACIS contains two sections. Section I, listing ograms for which ACIS were previously submitted, includes Antiip Missile Systems, Large Area Ocean Surveillance Systems, ategic Warning and Attack Assessment, Advanced Isotope Separan and Centrifuge Enrichment, and NAVSTAR Global Positioning stem. While these programs have continuing arms control implicas, they have had no significant changes in funding, program direc-, policy, or international developments that would revise the ninistration's analysis forwarded in early 1981. The need for upd ACIS will be reevaluated as these programs evolve.

ction II includes other programs which meet congressional criteria CIS but for which in-depth ACIS were not prepared. For each am, a brief description is given along with its program element er and R-1 or P-1 report page and line number, as applicable.

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Activities within these programs are primarily associated with one or more of the following:

—Programs in too early an exploratory research and development stage to determine with precision their possible arms control implications.

—Programs providing continuing normal support for existing missions or deployed operational systems and organizations.

—Production and procurement of a developed weapon system; nonnuclear munitions, cartridges, projectiles, rockets, etc., and associated equipment; spares and repair parts; associated electronic, communications, training and support equipment; support, storage, industrial and test facilities construction and operations; utility and specialized vehicles, ships, tanks, and aircraft; miscellaneous production charges, first destination charges and outfitting costs. In themselves, none of the activities in this category is judged to have a significant impact on arms control policy or negotiations.

—Modification or modernization of an already procured system which does not significantly alter the characteristics of the system from an arms control standpoint.

—Programs which were analyzed as in-depth statements in previous years and found to have little, if any, additional arms control impact.

—Programs involving miscellaneous research, development, testing, and evaluation of programs not otherwise categorized, which are judged to have marginal, if any, impact on arms control policy or negotiations.

The abbreviated ACIS for the Department of Energy programs list those activities related predominantly to normal maintenance and reliability assessment of the nuclear stockpile. Because they do not provide for additional warheads/bombs or for significant changes in characteristics or deployments, none of them is judged to have a significant impact on arms control policy or negotiations. The ACIS lists 24 different nuclear warheads and gravity bombs, with a brief statement about the weapons systems for which they were developed.

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CONTENTS

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PART I: ARMS CONTROL IMPACT STATEMENTS SUBMITTED BY THE ADMINISTRATION

ICBM PROGRAMS

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11212F	TITAN Squadrons
11213F	MINUTEMAN Squadrons
Procurement	MINUTEMAN II/III
Procurement	ICBM C^3 Integration
DOE Program	W78 Warhead
64312F/11215F	MX
Procurement	Advanced ICBM (MX)
DOE	WXX MX Warhead
63311F	Advanced Strategic Missile Systems (ASMS)*

* Includes the Former Advanced Ballistic Reentry System (ABRES) program.

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All of these programs are directly related to maintaining or improving the capabilities of the US land-based ICBM force. As such, the arms control implications of these programs are best analyzed in a single impact statement.

II. PROGRAM DESCRIPTIONS

The US ICBM force is one of the three components of the US Triad of strategic nuclear offensive forces. The ICBM operational force is currently composed of 550 MINUTEMAN III (MM III) ICBMs, each with up to three multiple independently targetable reentry vehicles (MIRVs), 450 single warhead MINUTEMAN II (MM II) ICBMs, and 52 single warhead TITAN II ICBMs. These 1052 operational missiles will carry up to 2152 warheads of various yields and accuracies.

A. <u>TITAN Squadrons Program (PE 11212F)</u>.

TITAN II wings are located at Davis Monthan AFB, Arizona, McConnell AFB, Kansas, and Little Rock AFB, Arkansas. The missiles are dispersed in hardened underground launch complexes. The TITAN II weapon system achieved full operational capability in December 1963. The President has recently directed that all TITAN missiles be deactivated as soon as possible. [Deleted].

B. <u>MINUTEMAN Squadrons Program (PE 11213F)</u>.

The MINUTEMAN force is deployed in hardened and dispersed underground silos. The missiles are controlled by combat crews from hardened underground launch control centers. A number of

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improvements have recently been made or are being made in MINUTEMAN systems:

1. Survivability: The Silo Upgrade Program provides improved protection to the missile launch facilities from blast and shock, radiation, and electromagnetic pulse. Modification of all launch facilities was completed in January 1980.

2. Accuracy: The Guidance Improvement Program developed an improved computer software program for the MM III NS-20 Missile Guidance Set. The improved software has been deployed on all 550 MM III missiles and is predicted to improve operational accuracy. However, a high confidence estimate of the improvement will not be available until a sufficient number of operational test missiles have been launched.

3. Improved RV: The MK-12A reentry vehicle is being acquired to replace the MK-12 RV on 300 of the 550 MM III missiles currently deployed. Initial operational capability (IOC) was achieved in FY 1980. Deployment of the MK-12A on the 300 MM III missiles is scheduled to be completed in FY [deleted]. Current plans do not call for the MK-12A to be deployed on the remaining 250 MM III missiles.

The MK-12A RV was designed to be employed against the total spectrum of targets but increasingly has been planned for employment against a growing Soviet hardened target system, where its combination of yield and accuracy could be used to military advantage. Although the MM III in its current configuration is

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effective to some degree against hard targets, improved accuracies which may accrue as a result of the guidance improvement program and the higher yield of the MK-12A (W78) warhead would increase this capability.

4. Command, Control and Communications (C^3):

Three new or improved command, control, and communications systems are planned to be incorporated into MINUTEMAN launch control centers to improve existing communication links with higher command authorities: the Air Force Satellite Communications System (AFSATCOM); the 616A Survivable Low Frequency Communication System (SLFCS); and the Strategic Air Command Digital Network (SACDIN). These systems would reduce the transmission, receipt, and processing time for emergency action messages as well as the crew workload during time-urgent situations.

C. Procurement -- MINUTEMAN II/III and ICBM C^3 Integration.

Procurement of MINUTEMAN ICBMs and modifications to them are funded under four separate line items. Prior to FY 1981, a total of $12.8 billion was appropriated for procurement of MINUTEMAN ICBMs, associated research and development, and military construction. [Deleted]. In FY 1982, $110.7 million was requested for MM II/III improvements [deleted]. These funds completed procurement of the MK-12A reentry vehicle for the MM III. Final funding for ICBM C^3 integration is programmed in FY 1984. There are no funds requested for further MK-12A procurement.

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Procurement funds are also requested for Class IV modifications of MM II/III missiles to improve reliability, enhance performance and increase maintainability. $59.6 million was provided for these purposes in FY 1982 and $93.2 million is programmed for FY 1983.

D. W78 Warhead Program (DOE).

Development engineering of the MK-12A, W78 warhead was completed in FY 1977. [Deleted].

E. MX (PE 64312F/11215F).

1. Program Description.

The MX program provides for full-scale engineering development and test leading to production of a new, more capable ICBM. The missile booster, guidance and control systems, post-boost vehicle, and reentry system are being developed, tested, and integrated into a missile system. The first flight test is scheduled for January 1983. An initial operational capability is scheduled to be achieved in 1986.

MX subsystems are planned to be operational designs of the preprototype hardware currently under development. These include: (1) an improved guidance system; (2) the MX Post-Boost Vehicle which, although significantly larger than that on MM III, would use a similar well-proven technology and configuration; and (3) the Advanced Ballistic Reentry Vehicle (ABRV) currently being

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developed as part of the Advanced Strategic Missile Systems (ASMS) program. The final DOD decision on the MX reentry vehicle has resulted in selection of the ABRV as the new baseline.

2. Program Status.

In early October, 1981, the Administration announced that it would continue to develop the MX and that at least 100 MX ICBMs would be deployed, but that they would not be deployed in a Multiple Protective Structures (MPS) basing mode as previously planned. Initial MX deployment will be in a limited number of MM silos. A permanent deployment mode will be decided by mid-1983. The options being considered include continuous patrol aircraft, deep underground basing, and hard silos in combination with ballistic missile defense (BMD). Ballistic missile defense research and development will be accelerated in order to assess its potential for employment in conjunction with MX deployment (See the BMD ACIS for further discussion of this question). The initial deployment of the MX in existing ICBM silos will provide a near-term improvement in the US ICBM component of the Triad.

Contracts for full-scale engineering development have been awarded for all phases of the missile. The development of the MX missile system is not a high-risk engineering effort.

The Administration included funds for full-scale development of the MX in the DOD FY 1979 Supplemental Appropriations request. This included work on the three missile stages, the post-boost vehicle, the guidance and control system, and the reentry system. Construction of the MX test facilities at

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Vandenberg AFB, California is being funded under PE 11215F (MX Squadrons).

The System Design Review was conducted in September 1980, and preliminary design reviews were conducted in FY 1981 to review and approve hardware design concepts and to authorize initiation of detailed hardware designs. Completion of propulsion flight proof testing is scheduled for September 1982; the first flight test is scheduled for early 1983, and a production decision on the MX is projected for mid-1983, leading to an initial operational capability in 1986.

Estimates of the acquisition cost of the MX system are tentative, since cost depends in large measure on the details of the basing mode and the number of missiles to be deployed.

F. Procurement -- Advanced ICBM (MX).

The FY 1983 request of $1.5 billion funds the initial procurement of MX missiles and basing related hardware needed to deploy them.

G. WXX MX Warhead.

Until January 1982, the Air Force maintained the W78/MK-12A as the baseline warhead/reentry vechicle for the MX. The final DOD decision on the MX warhead has been made, resulting in the selection of a warhead to be mated with the Advanced Ballistic Reentry Vehicle (ABRV). [Deleted].

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H. <u>Advanced Strategic Missile Systems (PE 63311F)</u>.

The Advanced Strategic Missile Systems (ASMS) program provides for technology application and advanced development for ballistic missile systems, subsystems, reentry and penetration aids for existing and future ICBMs, IRBMs, and SLBMs. For each of the past five years, ASMS (formerly ABRES) funding has been approximately $100 million. A total of $50 million was requested for ASMS in FY 1982 and $52.3 million is being requested in FY 1983. However, Congress has appropriated $100 million for FY 1982. [Deleted].

[Deleted].

III. STATED MILITARY REQUIREMENTS

Current US policy is to deter nuclear war by assuring that, whatever the level of aggression contemplated, no potential adversary could ever conclude that victory in any meaningful sense of the word would be attainable or worth the costs that would be incurred. US strategy reflected in that policy requires that US plans and capabilities be structured to permit flexible employment

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of strategic nuclear forces. Thus, current US strategy requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of retaliatory destruction, in a selective and measured manner, of Soviet political and military control targets, military forces both nuclear and conventional, war-supporting industry, and a broad set of industrial/economic targets.

A fundamental objective of US national security is the maintenance of secure strategic nuclear retaliatory forces which could absorb any first strike and respond with an attack of such unacceptable proportions that any potential aggressor would be deterred from attacking the US or its allies. In order to accomplish this fundamental objective, the US relies on the flexible, redundant and diverse capabilities provided by a mix of strategic delivery vehicles: land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and long-range manned bombers. This strategic force structure severely complicates Soviet offensive and defensive planning and provides a hedge against Soviet technological breakthroughs or the catastrophic failure of any one element of the Triad to perform its assigned wartime missions. The complementary and muturally reinforcing character of these strategic forces enables US officials to maintain a high level of confidence in the US strategic deterrent posture.

The ICBM force provides the necessary capability for employment by the National Command Authority in any phase of a nuclear conflict, from limited options to full-scale retaliation.

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The combination of accuracy, reliability, rapid retargeting, secure, survivable C^3, and ballistic penetrativity makes the land-based missile an extremely flexible system. These attributes of the land-based ICBM force, coupled with high alert rate and excellent responsiveness, have made and will continue to make a major contribution to the deterrent posture of the United States.

US strategic forces also serve broader political objectives by denying the Soviet Union any political or military benefits that might result if Soviet leaders, allies, or third countries perceived Soviet strategic forces to be superior.

While the analysis of strategic vulnerability is sensitive to many variables and scenarios, it is generally accepted that the pace and scope of Soviet ICBM programs pose a threat to the survivability of the current US fixed-silo ICBMs in the 1980s. [Deleted]. Projected deployments show this number increasing during the 1980s.

The decision to maintain the deterrent value of a survivable ICBM leg of the Triad, and to redress the political-military implications of an asymmetry in prompt hard-target-kill capabilities favoring the Soviet Union, has led to the decision to develop and deploy the MX missile.

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IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
TITAN Squadrons (11212F)										
Development	$ 922.8	-	-	[						
Production	$ 862.9	-	-							]
MINUTEMAN Sqdns. (11213F) (includes C^3 integration)										
Development	$3907.3	19.6	12.9							
Production	$8678.9	54.3	-							
MK-12A RV (11213F)										
Development	$ 145.4	-	-							
Production	$ 335.8	56.4	-							
W78 Warhead (DOE)										
Development	$									
Production	$ [									]

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IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
MX (64312F/11215F)										
Silo Deployment										
Development	$2311.6	1963.1	2759.5	[						]
Production	$ -	-	1497.1							
Construction	$ 140	11	207							
Follow-on ICBM Deployment										
Development	$ -	20	310							
Production	$ -	-	-			DELETED				
Construction	$ -	-	-							
WXX MX Warhead (DOE)	$ -	-	N/A							
ASMS (63311F)										
Development	$2153.3	99.6	49.7	[						]

* TBD - To be determined based on future development/deployment decisions.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to support US national security objectives and through the achievement of these objectives to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements at reduced force levels that are genuinely stabilizing, equitable and verifiable. At the same time, it is recognized that certain basic military capabilities, to include secure strategic retaliatory capabilities, must be maintained to deter attack on, or coercion of, the United States and its allies, to protect vital national interests, and to insure strategic stability.

US arms control policy emphasizes the necessity for the verification and equity of arms control agreements. This requires improved means for verifying compliance when national technical means (NTM) will not suffice.

B. Relation to Arms Control Agreements.

1. SALT I Interim Agreement.

The 1972 SALT I Interim Agreement has expired, but both the US and the Soviet Union have stated their intention to avoid taking actions inconsistent with its provisions for the time being. SALT I permitted modernization and replacement of strategic ballistic missile systems. Although it included some restrictions on the deployment of new fixed land-based ICBM launchers, it did not limit the development of new missiles for either fixed or mobile

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launchers.* Thus, the development of MX, prospective improvements for MINUTEMAN, and development of a maneuvering reentry vehicle in the ASMS program, are not inconsistent with any provisions of the Interim Agreement.

2. SALT II Agreement.

The SALT II Agreement, which was to run through 1985, has not entered into force. A comprehensive interagency review of US strategic arms control policy is underway; it is the position of this administration that SALT II will not be ratified in its present form. Until the review is completed, it remains in the US interest in the near term to take actions that will avoid undermining the SALT Agreements so long as the Soviet Union exercises similar restraint and the provisions remain consistent with necessary US force modernization.

The numerical limits established by the SALT II Agreement would not have any immediate effect on the MX program, as no deployments are scheduled through 1985.

The "new types" provision of the SALT II Agreement limits each side to flight-testing and deployment of only one new type

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* The Interim Agreement states: Article I: The Parties undertake not to start construction of additional fixed land-based intercontinential ballistic missile (ICBM) launchers after July 1, 1972.

Article II: The Parties undertake not to convert land-based launchers for light ICBMs, or for ICBMs of older types deployed prior to 1964, into land-based launchers for heavy ICBMs of types deployed after that time.

Article IV: Subject to the provisions of this Interim Agreement modernization and replacement of strategic offensive ballistic missiles and launchers covered by this Interim Agreement may be undertaken.

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of ICBM for the duration of the Treaty. The MX will be the one new ICBM type flight-tested by the US in the foreseeable future. Article IV of the SALT II Agreement prohibits a) the conversion of launchers of light ICBMs, or of ICBMs of older types deployed prior to 1964, into launchers of heavy ICBMs of types deployed after that time, and b) an increase in the original internal volume of an ICBM silo launcher by more than thirty-two percent in the process of modernization and replacement of ICBM silo launchers. The launch-weight and throw-weight of the Soviet SS-19 are defined in the SALT II Agreement as the upper limits for "light" ICBMs, and the MX has been designed to be smaller than the SS-19 on both counts; hence, deployment of the MX which has been designated as a "light" ICBM, would not violate the first restriction. MX deployment in existing MM silos without increases in individual silo volume, would not violate the second restriction.

Except with respect to the one "new type" of ICBM that is permitted, Article IV prohibits the flight-testing or deployment of ICBMs which are different from those ICBMs flight-tested as of May 1, 1979 in the following respects:

- the number of stages;
- the length, the largest diameter, the launch-weight, or the throw-weight of the missile (but variations of up to 5% are permitted with respect to these measures);
- the type of propellant (that is, solid or liquid) of any of its stages.

No modifications of MINUTEMAN II or III are planned which would be affected by any of these limitations, and all planned ASMS

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flight-tests utilizing MINUTEMAN I boosters would satisfy these limitations.

The MK-12A RV and the W78 warhead in the MK-12A would not be affected by the limitations on "new types." Furthermore, the MK-12A RV was tested before May 1, 1979 and thus could not be covered by SALT II limitations concerning the weight of RVs on existing types of ICBMs.

3. The Non-Proliferation Treaty (NPT).

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 114 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon-state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As part of the 1979, two-track INF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on intermediate-range nuclear forces. The US and the USSR began the negotiations on November 30, 1981 in Geneva, Switzerland. The US held extensive consultations with its Allies in preparation for these negotiations.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an

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intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to the Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

In the absence of further progress on nuclear arms control agreements, extensive nuclear modernization programs will probably lead to additional criticism of US and Soviet behavior under Article VI and could eventually weaken the effectiveness of the NPT in preventing the spread of nuclear weapons. Continuation of the strategic arms negotiations or progress in negotiations on intermediate-range nuclear forces would help to mitigate these problems.

It is also possible that US (or Soviet) programs could be cited by some governments as convenient rationalizations for building their own nuclear weapons. It must be noted, however, that many important non-nuclear-weapon countries are US allies that rely on the US nuclear arms umbrella and look upon US nuclear modernization as essential. Insofar as these countries are concerned US nuclear modernization could inhibit proliferation.

Unilateral US restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous

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political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

4. The Threshold Test Ban Treaty and the Treaty on Underground Nuclear Explosions for Peaceful Purposes.

The terms of the Threshold Test Ban Treaty (TTBT) and the Treaty on Underground Nuclear Explosions for Peaceful Purposes (PNET) limit the United States and the Soviet Union to nuclear tests with design yields of no more than 150 kilotons (KT) of explosive yield. The TTBT and PNET have been signed by the US and the USSR but have not yet been ratified by either. Both the US and the USSR have stated their intentions to abide by the yield limitations of the TTBT pending ratification. [Deleted].

Final selection of the baseline MX warhead [deleted]. In this sense, deployment of the MX is constrained by the TTBT.

5. The ABM Treaty.

The ABM Treaty permits development and testing of fixed land-based ABM systems and their components at agreed test ranges. Both the Soviet Union and the US have R&D efforts in ballistic missile defense. A viable ABM defense of US ICBMs

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could improve ICBM survivability and is under study as an element of a long term basing option for the MX. Adoption of an ABM defense of MX could require amending the ABM Treaty or withdrawal from the Treaty.*

The availability of advanced US technology, such as advanced MaRVs, precision guidance, and penetration aids provides disincentives for the Soviets to upgrade or deploy an improved ABM system around Moscow or elsewhere by reducing its potential effectiveness in preventing the arrival of US ballistic missile RVs and thereby making its deployment economically and militarily unsound. The US R&D program could, therefore, reinforce the ABM Treaty by discouraging evasion or abrogation.

C. Effect on Current and Prospective Negotiations.

1. START.

On November 18, 1981 President Reagan announced that the US will seek to negotiate substantial reductions in nuclear arms which would result in levels that are equal and verifiable. The timing of such negotiations -- to be called Strategic Arms Reduction Talks (START) -- is being discussed with Soviet representatives. The US START proposals will be based on fair-minded principles: substantial, militarily-significant reductions in force, equal ceilings for similar types of forces, and adequate provisions for verification. The approach to verification will be to emphasize

* For a complete discussion, see the ACIS on Ballistic Missile Defense.

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openness and creativity -- rather than the secrecy and suspicion which have undermined confidence in arms control in the past.

The precise form that US START proposals will take is now under review. However, the President stated on November 18, 1981, that while we can hope to benefit from work done over the past decade in strategic arms negotiations, we will do more than simply begin where these efforts previously left off. The President also said that we will attempt major qualitative and quantitative progress and seek to achieve truly substantial reductions in strategic arsenals.

The proposed MX basing systems lend themselves to flexible force sizing. The number of missiles eventually deployed could be sized upward or downward depending on the size and character of projected threats/strategic force targeting requirements. The number of MX missiles might have to increase if the Soviet threat increased. Within a strategic arms control framework, it would be easier to predict confidently how extensive an MX deployment is required to ensure an adequate ICBM retaliatory capability. The MX deployment could, of course, be sized in various ways to meet increases in the projected threat under either an arms limitation or a no-arms limitation environment.

2. <u>The Comprehensive Test Ban Treaty (CTBT).</u>

[Deleted]. The US has been engaged in Comprehensive Test Ban Treaty negotiations with the United Kingdom and the USSR.

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These negotiations were recessed in November 1980 without setting a resumption date. All nuclear test limitations are currently under US government review. [Deleted].

D. Effect on Global and Regional Stability.

The effect of US ICBM programs on stability, particularly the impact of the October 1981 decisions on MX deployment, is overall positive. In the context of this analysis, strategic stability is defined as the maintenance of conditions such that neither the US nor the USSR is compelled or induced to employ its strategic forces. The concept of crisis stability extends beyond the nuclear balance to encompass the broader political-military relationship; the objective of crisis stability is to prevent adverse developments in US-Soviet relations outside of the strategic sphere from escalating to central nuclear war. In order to ensure stability in crises, the US seeks to maintain a strategic force posture which denies the Soviet Union any confidence in utilizing its strategic forces as instruments of political or military coercion.

In this context, considerable concern has developed over the implications for crisis stability of the increasing vulnerability of silo-based ICBMs. Less vulnerable basing options, being examined

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as part of the MX program, address this concern.

It is generally recognized that the Soviet ICBM force now has a much greater prompt hard-target-kill capability against our ICBM force than our force has against theirs, making our ICBMs much more vulnerable to preemptive attack. It is also recognized, however, that our ICBM force is a much smaller component of our strategic forces than the Soviet ICBM force is of their strategic forces. Differences in view on the implications of prompt hard-target-kill capability emerge over the conditions under which each side would be able or impelled to exploit the asymmetry favorable to itself for political or military purposes.

There are political as well as military reasons to retain US prompt hard-target-kill capabilities. Failure to deploy MX could lead to perceptions of Soviet advantage with the following implications: (1) greater Soviet freedom of action in the employment of conventional forces; (2) greater Soviet latitude in the implicit utilization of nuclear strength for political coercion; (3) the development of new perceptions of relative US and Soviet strength among third countries that could have a wide impact on US foreign policy; and (4) an adverse affect on Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe. Thus, the decision to build and deploy the MX missile reflects the judgment that the paramount necessities at present are to maintain the ICBM leg of the Triad's unique contribution to credible deterrence and to deny the Soviets any political or military advantages that may result from a growing asymmetry in relative ICBM capabilities. On

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balance, it is judged that there would be little prospect for improving crisis stability and for concrete arms control results involving Soviet ICBMs in the absence of a decision to modernize the US ICBM force.

The initial deployment of less than 50 MXs in MINUTEMAN silos constitutes an interim way of partially redressing the imbalance in prompt hard-target-counterforce capability. However, all the other options under consideration address the vulnerability problem directly, as does the program for improving command and control systems for our strategic forces. The initial deployment of MXs in fixed silos, moreover, will not represent a threat to the entire force of Soviet ICBMs, which now total about 1400.*

The effect of the MX program on stability will depend in very large part upon Soviet interpretation of its implications for the vulnerability of their strategic forces overall, and Soviet perceptions could be heavily influenced by the fact that they have about three-quarters of their strategic warheads deployed in silo-based ICBMs, while we have only about one-quarter of our strategic warheads so deployed.

Although the ultimate Soviet response to the MX will to a large extent depend upon the outcome of our future basing

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* At a maximum, assuming 10 RVs per missile, deployment of 50 MX missiles will add only 500 highly accurate RVs to the US total, and if some MXs displace MINUTEMAN IIIs the increase in RVs will be reduced below 500 because the latter have up to 3 RVs. By the usual rule of thumb of 2 RVs per silo, 500 additional RVs would threaten only 250 more Soviet ICBMs.

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decisions, the basic question in the meantime is whether the Soviets interpret our overall strategic program as representing primarily an escalation of the threat to their strategic forces or recognize the new program's clear emphasis on retaliatory capability. If the Soviets recognize the retaliatory aspects of the US program, they should find opportunities for enhancing their security through arms control.

The effects of MX deployment on regional stability will be felt most in the perceptions of US allies. In Western Europe and elsewhere, ICBM force modernization programs could affirm US resolve to pursue equivalency with the Soviet Union in strategic forces, and could strengthen perceptions of US determination to prevent strategic force asymmetries which would provide political or perhaps military advantages to the Soviet Union.

E. Technological Implications.

The sophistication of the R&D included in US ICBM programs would not be expected to stimulate technological competition with countries other than the Soviet Union.

ASMS technology, with the possible exception of AMaRV and precision guidance activities, is unlikely to stimulate additional Soviet efforts along similar lines.

The deployment by the US of systems which would significantly improve missile accuracy or the pursuit of technology programs (e.g., AMaRV or precision guidance) which could provide even greater accuracies, could stimulate continued competition with the Soviet Union in this area, [deleted]

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[deleted].

The Soviets could also turn to basing modes offering increased survivability.

F. <u>Potential Interaction with Other Programs</u>.

The strategic modernization program will guide the long term development of the US strategic forces. It will help redress the deteriorated strategic balance with the Soviet Union. The result will be a deterrent that is far more secure and stable than exists today. The program will also provide a force that is more resilient to Soviet attempts to negate US progress. This should, in turn, create the incentives necessary for the Soviets to respond seriously to proposals for meaningful and equitable arms reductions.

G. <u>Verification</u>.

The basic SALT II Agreement explicitly permits modernization and replacement of strategic weapon systems, including the development of mobile ICBM launchers, and after the Protocol was to have expired on December 31, 1981, deployment of and flight-testing from mobile ICBM launchers. SALT I and SALT II place constraints on the testing and deployment of "new types" of ICBMs. Under these provisions, modernization and replacement of ICBMs within set boundaries and deployment of one new light ICBM are permitted. Deployment of a new fixed ICBM can be verified by US and Soviet national technical means, as has been the case in the past.

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Although permitted by the basic SALT II Agreement after the expiration of the Protocol, the deployment of a mobile ICBM, particularly a Soviet mobile ICBM, could raise verification problems.

The essential feature of all mobile-basing schemes -- concealment of the precise location of the missile/launcher -- would complicate the task of verifying that the number of launchers deployed does not exceed prescribed limits. However, such mobile strategic forces could be verified even though they are not subject to continuous observation, as has been the case with ballistic missile submarines (SSBNs). There are, however, important distinctions with consequences for verification between ICBMs and SSBNs. For ground-mobile ICBM schemes, cooperative measures would be required to provide adequate assurance that agreed limitations were being observed.*

Since Soviet technology for ground-mobile launchers is already well developed, the Soviet Union could respond to the increased threat posed by MX by deploying ground-mobile ICBMs. [Deleted]. The different intelligence-gathering

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* Cooperative measures: measures taken by one side in order to enhance the other side's ability to verify compliance with the provisions of an agreement. Such measures can be voluntary or negotiated.

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environments in the two countries would make it more difficult for the US to monitor compliance without adequate cooperative measures [deleted].

It is clear that the increased capabilities of each side's strategic forces place increased burdens on monitoring capabilities, although such obstacles can be overcome by negotiated agreement and cooperative measures if both sides desire to do so.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The increasing vulnerability of the MINUTEMAN force, the necessity to maintain the deterrent contribution of the ICBM leg of the Triad, the political and military implications of an asymmetry in ICBM capabilities (including prompt, hard-target-kill capabilities) favoring the Soviet Union, and the on-going and projected overall buildup of Soviet strategic forces have led to the decisions to build the MX missile and to continue upgrading the MINUTEMAN force. The decision to deploy an MX reflects the judgment that the paramount necessities are to maintain the ICBM leg of the Triad's unique contribution to credible deterrence and to deny the Soviets any political or military advantages that may result from a major asymmetry in relative ICBM capabilities. The greater capability of the MX will maintain the US ICBM force's retaliatory capabilities, further redressing the perception, and the reality, of increased Soviet advantages in certain force characteristics. Improved prompt hard-target-kill capabilities also could permit the US to attain an effective capability against

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Soviet military and command/control targets which have been increasingly hardened.

There are political as well as military reasons to retain US hard-target-kill capabilities. Failure to deploy MX could lead to perceptions of Soviet advantage with the following implications: (1) greater Soviet freedom of action in the employment of conventional forces; (2) greater Soviet latitude in the implicit utilization of nuclear strength for political coercion; (3) the development of new perceptions of relative US and Soviet strength among third countries that could have a wide impact on US foreign policy; and (4) an adverse affect on Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe.

Deployment of the MX and modifications to the MINUTEMAN would be consistent with the terms of SALT I and II. These agreements would allow modifications of existing weapon systems within specific constraints, and the SALT II agreement would permit deployment of one new type ICBM.

Full deployment of 100 MXs could result in an increase in US prompt hard-target-counterforce capability to the point that the Soviets perceived a substantially greater threat to their ICBM force. The new US strategic program will raise fundamental questions for the Soviets about their heavy reliance upon vulnerable first-strike strategic weapons as the US improves its less vulnerable second-strike capabilities.

Although permitted by the basic SALT II Agreement after the expiration of the Protocol, Soviet deployment of a mobile

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ICBM could raise serious verification problems. Soviet technology for mobile launchers is well developed. Cooperative measures will be an essential element in any future strategic arms control agreement, and their significance will be significantly enhanced if it is necessary to monitor future Soviet ground-mobile ICBM deployments.

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SSBN/SLBM PROGRAMS

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11221N	Fleet Ballistic Missile System (Improved Accuracy Program)
11228N	TRIDENT Submarine (SSBN)
11228N	TRIDENT I (C-4) Missile
63371N	TRIDENT II Missile System
DOE Program	W76 (TRIDENT I)
Procurement	TRIDENT
Procurement	UGM-96A (C-4) TRIDENT I
Procurement	UGM-73A (C-3) POSEIDON
Procurement	UGM-73A (C-3) POSEIDON Modifications
11402N	Navy Strategic Communications
Procurement	EC-130Q Procurement and Modifications
11401N	Extremely Low Frequency (ELF) Communications

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These programs are all related since each contributes directly to the Nuclear Ballistic Missile Submarine/Submarine Launched Ballistic Missile (SSBN/SLBM) component of US strategic capabilities. Arms control impact statements are required by the Arms Control and Disarmament Act for each of these programs.

II. PROGRAM DESCRIPTIONS

A. Capabilities.

The TRIDENT submarine, missile, and warhead programs are designed to provide a new class of fleet ballistic missile submarines and associated SLBMs to augment and eventually replace the present POLARIS and POSEIDON strategic submarines. US strategic submarines have the peacetime mission of deterrence of nuclear war, and the wartime missions of strategic and theater nuclear strikes, as well as deterrence of further escalation.

Fleet Ballistic Missile (FBM) System (PE 11221N).

This program element contains three projects designed to fund development and maintenance of POSEIDON and TRIDENT I strategic weapons systems as well as other improvement projects for fleet ballistic missile submarines. As such, it would extend the effectiveness, survivability and capebilities of both the current and future nuclear powered submarine ballistic missile systems.

The FBM System Project (J0091-SB) has focused on improvements to SSBN unique sonars and strategic weapons systems. The Sonar Evaluation Program was started in FY 1975 to provide continuing objective assessment of SSBN sonar system performance in the operational environment. FY 1982 efforts were aimed at

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reliability and maintainability improvements to present FBM sonar systems. Vulnerability and effectiveness studies have been conducted to identify potential improvements to maintain the survivability of US SSBNs against postulated threats and increase the capability of weapons systems. These efforts will continue in FY 1983. The development effort for the conversion of a cargo ship to a FBM cargo ship (TAK) to service SSBNs with spare parts, food supplies, and other essentials led to the award of a conversion contract in April 1981. The Navy is also validating NAVSTAR Global Positioning System (GPS) performance as FBM user equipment under this project.

The SSBN Unique Sonar Project (S0942) is an effort to maintain the acoustic advantage of US SSBNs over Soviet nuclear submarines in the future. This is most relevant for [deleted] in a multicontact environment such as that found in the North Atlantic and Mediterranean patrol areas. This project is designed [deleted]. Existing off-the-shelf Navy standard processing and display hardware is being utilized in this effort. The evaluation of the BQR-15 array modification is planned for completion in FY 1982 with production to begin in FY 1983.

The SSBN Unique Countermeasure Development Project

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(S1265) was transferred to PE 11221N from PE 64562N in FY 1981. [Deleted]. The design and fabrication phases specified by the AN/BLR-14 ECPs were completed and proof testing began in FY 1981. In FY 1982 in-plant testing continues and will be validated by at-sea tests. A total procurement of [deleted] is planned. The plan for FY 1983 is to conduct technical and operational evaluation of the AN/BLR-14 countermeasures receiving set improvements.

TRIDENT Submarine (PE 11228N) and TRIDENT Procurement.

At the end of FY 1982, 544 operational US submarine ballistic missile launchers in 33 TRIDENT and POSEIDON submarines will be in commission. The inventory will consist of 304 POSEIDON C-3 launchers in 19 POSEIDON submarines, 192 TRIDENT I C-4 launchers in 12 POSEIDON submarines, and 48 TRIDENT I C-4 launchers in 2 TRIDENT submarines. There are 15 TRIDENT SSBNs in the January 1981 Five Year Defense Plan with the total number to

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be built as yet undermined.* See TABLE 1 for TRIDENT characteristics.

The TRIDENT, also known as the OHIO class submarine, displaces 18,700 tons when submerged. It is designed to operate at greater maximum speeds and emit less noise than the POSEIDON and POLARIS submarines. In addition, TRIDENT is expected to stay on patrol longer than POSEIDON submarines over the lifetime of the system, largely due to shorter refits and overhauls. Its greater at-sea time, combined with the longer range of its missiles, permits basing in the United States, and the eventual phasing out of the present POSEIDON base overseas. In this regard, it should be noted that the use of Rota, Spain as an SSBN upkeep site was discontinued in the summer of 1979. The site was relocated to Kings Bay, Georgia. The use of Guam as a SSBN upkeep site was discontinued in the fall of 1981.

The sea trials commenced in June 1981 for the first submarine; the initial operational capability (IOC) date of the lead TRIDENT submarine, the OHIO, is September 1982. Plans are to deploy the first TRIDENT submarines in the Pacific from a base at

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* All ten POLARIS submarines, each armed with 16 POLARIS missiles, have been withdrawn from the strategic force. Five POLARIS SSBNs were withdrawn in FY 1980 and five during FY 1981. Two of the POLARIS SSBNs were dismantled in February 1981 in accordance with agreed procedures of the Standing Consultative Commission (SCC) to comply with the terms of the SALT I Interim Agreement. The remaining 8 SSBNs are still considered as SALT accountable. Their missiles have been (or soon will be) off loaded and their weapons systems inactivated.

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TABLE 1: Planned TRIDENT Submarine Characteristics

Operational:	
Maximum Speed (submerged)	about [deleted] knots
Endurance:	
Range	bounded by crew and supply constraints
Stores	90 days
Armament:	
Torpedo Tubes	4
SLBM Tubes	24
Availability of SSBNs operationally ready at-sea	66%
Technical:	
Length	560 ft.
Beam (maximum hull diameter)	42 ft.
Draft, Navigational	36.5 ft.
Displacement (submerged)	18,700 tons
Operating Depth	[deleted] ft.
Propulsion: type	Nuclear
shaft horsepower	[deleted].hp.
Crew Size	157

Bangor, Washington. Almost all targets in the Soviet Union will be in range of TRIDENT I missiles from TRIDENT submarines operating in the Pacific. Deployment of TRIDENT I missiles in the Atlantic in POSEIDON or TRIDENT SSBNs will allow the coverage of all Soviet targets.

The Navy has chosen Kings Bay, Georgia as the site for the east coast TRIDENT submarine base. The base has also been developed to support the 12 POSEIDON submarines that are being modified to receive TRIDENT I missiles.

TRIDENT submarines will be manned by two alternating crews of 157 men (15 officers, 142 enlisted). The 95-day operating cycle will consist of a 25-day refit period followed by a 70-day at-sea period. Crew endurance is the dominant limiting

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factor in the TRIDENT's ability to stay at-sea.

B. Program Status.

There have been 9 TRIDENT submarines authorized through FY 1981. Long-lead funding has been authorized for a total of 11 TRIDENTs. Funding estimates included in the submarine program are based on the latest experience in ship construction and reflect current OSD guidance on anticipated inflation rates. The FY 1982 request included full funding for the tenth TRIDENT submarine but was denied by Congress. Advance procurement to order critical long lead ship components for the eleventh and twelfth TRIDENT submarines, plus funding for escalation cost on prior year ships are still being considered and will be reported out of the Senate-House Conference Committee at a later date. This additional escalation is required to cover the differences between what was previously budgeted for the earlier ships and the escalation rates now being experienced. The ultimate size of the TRIDENT submarine force has not been determined and will depend on many factors, including: (a) assessments of the size and capability of Soviet strategic and ASW forces; (b) the cost-effective life span of the POSEIDON SSBN force; (c) possible ceilings on strategic forces negotiated in strategic arms reductions negotiations; and (d) the acceptability of alternative strategic programs when compared to TRIDENT.

After studying the cost-effectiveness the Navy has decided to extend the service life of POSEIDON submarines to about 30 years. Major policy decisions affecting the role for SLBMs or changes in US targeting requirements could influence the ultimate

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TRIDENT force size, as could Strategic Arms Reduction Talks (START) limits. A basic TRIDENT building rate of one SSBN per year is projected See TABLE 2 for the TRIDENT construction schedule.

The first 6 TRIDENTS are scheduled to be deployed by the end of 1986. If TRIDENT SSBN's were constructed as now projected, the US would have [deleted]. When coupled with the 31 POSEIDON SSBNs, this force would contain 832 launchers,* an increase from 656. With MIRVed SLBM launchers the increase is from 496 to 832. (See TABLE 2).

TRIDENT I (C-4) Missile (PE 11228N) and TRIDENT I Procurement.

A total of [deleted] TRIDENT I missiles would be procured for the first [deleted] TRIDENT submarines, POSEIDON backfits, testing, and spares: [deleted] to be deployed on TRIDENT and POSEIDON submarines and [deleted] for testing, logistical support, and spares. A total of [deletad] TRIDENT I SLBMs would be acquired for the 12 POSEIDON submarines and [deleted] for testing, logistical support, and spares. A total of [deleted] TRIDENT I SLBMs would be acquired for the 12 POSEIDON submarines which are being modified to carry the TRIDENT I missile, [deleted] for submarine equipment, and [deleted] for testing and logistical support. See TABLE 3 for characteristics of the TRIDENT I (C-4) Missile.

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* Twelve of the POSEIDON SSBNs will have been backfitted to carry TRIDENT I missiles and 19 will remain with POSEIDON missile loads.

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TABLE 2: SSBN/SLBM Schedule (for end of FY)

	Cumulative Forces After Initial Sea Trials										
	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89
TRIDENT SSBNs*	0	0	1	2	3	5	6	8	9	10	11
with TRIDENT I SLBMs	0	0	24	48	72	120	144	192	216	240	264
TRIDENT SSBNs	0	0	0	0	0	0	0	0	0	0	0
with TRIDENT II SLBMs**	0	0	0	0	0	0	0	0	0	0	0
POSEIDON SSBNs*	0	5	11	12	12	12	12	12	12	12	12
with TRIDENT I SLBMs	0	80	128	192	192	192	192	192	192	192	192
POSEIDON SSBNs*	31	26	20	19	19	19	19	19	19	19	19
with C-3 SLBMs	496	416	320	304	304	304	304	304	304	304	304
POLARIS SSBNs*	10	5	0	0	0	0	0	0	0	0	0
with A-3 SLBMs	160	80	0	0	0	0	0	0	0	0	0

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* Each TRIDENT SSBN w/TRIDENT I SLBMs may carry an operational load of up to [deleted] RVs. The decision as to which RV will be used on the TRIDENT II system has not yet been made. However, studies indicate that TRIDENT II SLBMs on TRIDENT II SSBNs could carry as few as [deleted] RVs with [deleted] KT warheads or as many as [deleted] RVs with [deleted] KT warheads to total as many as [deleted] RVs per SSBN. Each POSEIDON SSBN w/TRIDENT I SLBMs will carry a normal operational load of [deleted] RVs; each POSEIDON SSBN w/C-3 SLBMs, [deleted] RVs [deleted]; each of the 16 POLARIS A-3 SLBMs carried the equivalent of one independently-targetable RV, although each missile dispersed 3 RVs around a single target.

** The first TRIDENT SSBN with TRIDENT II missiles is programmed to be deployed in December [deleted].

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TABLE 3: <u>Characteristics of the TRIDENT I (C-4) Missile</u>

Operational:		
	Maximum range at full payload ([deleted] RVs)	4230 NM
	Maximum range ([deleted] or fewer RVs)	[deleted] NM
	System accuracy (CEP)	[deleted] NM at 4000 NM range
	System reliability	[deleted]
	Maximum re-entry vehicles per missile	[deleted] RVs
	Explosive yield per warhead	[deleted] KT
Technical:		
Weight:	Launch weight	[deleted] lbs.
	Throw-weight	[deleted] lbs.
	Re-entry vehicle weight	[deleted] lbs.
Size of missile:	Length	34.1 ft.
	Diameter	6 ft. 2 in.
Guidance		Stellar-aided inertial
Propulsion		Solid fuel

The 25 missile TRIDENT I flight test program was completed on July 31, 1979. Eighteen missiles were launched from a pad at the Eastern Missile Test Range and 7 more from a POSEIDON SSBN. The IOC for the TRIDENT I missile in a backfitted POSEIDON SSBN occurred on October 20, 1979.

TRIDENT I missiles are equipped with the MK-4 re-entry vehicle. TRIDENT I missiles are also being tested with MK-500 EVADER Maneuvering Re-entry Vehicle (MaRV) whose feasibility was demonstrated successfully in earlier tests. This is a first generation MaRV that could be used to counter Anti-Ballistic Missiles (ABMs) should the Soviets upgrade or expand their existing ABM systems in the future. The objective of the MK-500 program is to obtain, by the end of FY 1982, a [deleted] year readiness posture to an IOC through periodic [deleted]

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participation in TRIDENT I missile flight tests-of-opportunity. The MK-500 also could provide the technology base for future advanced maneuvering re-entry vehicles. There are no plans at this time to produce the MK-500.

TRIDENT I (W76) Warhead (DOE Program).

The TRIDENT I missile MK-4 re-entry vehicles are equipped with the W76, a [deleted].

A warhead for the TRIDENT II missile has not yet been chosen. Options being considered by DOE and DOD include [deleted].

TRIDENT II Missile (PE 63371N).

In October 1981 the President formally approved his Strategic Forces Modernization Program. Part of this decision was to pursue the development of the TRIDENT II, or D-5 missile, with an IOC of [deleted]. See TABLE 4 for characteristics of the TRIDENT II missile.

UGM-73A (C-3) POSEIDON Maintenance and Mods Procurement.

The POSEIDON SLBM concept originated as a result of advanced POLARIS A-3 design studies. Its development was started in 1965, and it became operational in 1971. POSEIDON's increased

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TABLE 4: Characteristics of the TRIDENT II Missile*

Maximum range at full payload	4300 NM
Maximum range with reduced payload	[deleted] NM
System accuracy (CEP)	[deleted] ft. at 4000 NM range
System reliability	[deleted]
Explosive yield	[deleted] KT
Guidance options	To be determined
Propulsion	Solid fuel
Throw-weight	6000 lbs. (max.)

size and advanced design enabled it to deliver roughly [deleted] the payload with [deleted] the accuracy of the POLARIS A-3. The program to convert 31 SSBNs from POLARIS to POSEIDON began in early 1969 and was completed in 1978. Although POSEIDON missiles are no longer in production, funds are required to sustain support of the POSEIDON weapon system. $28.8 million was requested for FY 1982 with $18.7 million for such tasks as special purpose flight test instrumentation, special purpose material components for the missile's warhead, replacement of components with limited life, and $10.1 million for missile modifications.

Navy Strategic Communications (PE 11402N) and TACAMO (EC-130Q) Procurement.

The Navy Strategic Communications Program contains two major projects. The Shore-to-Ship Communications Systems Project (X1083) is responsible for the development and improvement of reliable, secure and survivable communications to deployed

* All figures are conceptual and planning goals which may be revised.

fleet ballistic missile submarines. The Navy Strategic Communications Program will continue the development, testing, and procurement of improved systems, components and antennas for shore and submarine-based communications systems. The TACAMO Project (W0793) concerns communications suite improvement and nuclear hardening of the TACAMO airborne communications platform.

TACAMO consists of a fleet of EC-130Q aircraft fitted with an array of communications equipment for receiving emergency action messages from the National Command Authorities and relaying them via a very low frequency (VLF) system to deployed SSBNs. The SSBNs receive the messages by [deleted]. The latter is the primary method since it minimizes the possibility of potential detection [deleted] by enemy forces. Although a number of surface, airborne, and satellite-based communications systems [deleted] are used on a day-to-day basis to communicate with strategic submarines, TACAMO is considered to be the primary means of communicating with SSBNs in a trans or post-attack environment.

Currently, TACAMO aircraft maintain a continuous air-borne alert only in the Atlantic Ocean area. Airborne alert is maintained in the Pacific Ocean area [deleted]. The coming deployment of TRIDENT SSBNs in the Pacific will increase the size and importance of the Pacific SSBN force, as well as the deployment

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ment area to be covered by TACAMO, and require the maintenance of an expanded airborne alert operation. [Deleted]. Additional EC-130Q aircraft are planned for procurement to increase the force level to 18 aircraft. A Service Life Extension Program was initiated in FY 1979 to extend the life of older aircraft. The Navy Strategic Communications Program would provide for upgrade of the communications equipment.

The TACAMO improvement program will continue TACAMO nuclear vulnerability assessment and the production and installation of improvements for the airborne communications system to increase its effectiveness and reliability. Under the FY 1982 TACAMO procurement program, funds are requested for the production of two additional EC-130Q aircraft and spares, and for continuing the Service Life Extension Program. Additional aircraft are planned for procurement through FY 1985 to maintain the force level at 18 aircraft while retiring older aircraft which have reached the end of their service life.

A new EMP hardened airframe to replace the EC-130 in performing the TACAMO mission is being developed. The new airframe, designated ECX, is capable of providing continuous two-ocean coverage. The ECX has been structured to permit an IOC in FY 1988.

<u>Extremely Low Frequency (ELF) Communications Program (PE 11401N)</u>. The ELF program provides for the development of a shore-to-submarine peacetime communications system. It would

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provide a reliable, secure link from operations headquarters and the National Command Authorities to SSBNs and nuclear attack submarines (SSNs) operating at optimum speeds and depths in operational areas without the necessity of using potentially observable trailing antennas or buoys. [Deleted] for day-to-day operations only, since it is vulnerable and not expected to survive in wartime.

The President's Strategic Forces Modernization Program includes the making of the US strategic communications and command systems more survivable in order to enhance communication with the strategic nuclear forces even after attack. The ELF system would consist of 56 miles of antenna in Michigan, with a transmitter at K.I. Sawyer AFB, tied electronically to a [deleted] mile antenna and transmitter at an existing test facility in Wisconsin. In [deleted] operation, the two transmitters would be able to provide communications coverage for [deleted] of the Atlantic and Pacific Oceans.

Congress approved $20 million for ELF in the FY 1979 budget but withdrew $15 million for other purposes in FY 1980. In FY 1981 Congress appropriated an additional $2.5 million for research and development work. These funds are being utilized to begin two limited test programs.

III. STATED MILITARY REQUIREMENTS

All ten POLARIS submarines have been withdrawn from the strategic mission at about the end of their designed 20 year life span, and the existing POSEIDON SSBN fleet is aging. The originally designed 20 year life span of POSEIDON has been extended to

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about 30 years. The TRIDENT SSBN program is intended to assure that the US retains a highly survivable sea-based strategic force far into the future based on foreseeable advances in Soviet ASW capabilities.

Current US policy is to deter nuclear war by assuring that, whatever the level of aggression contemplated, no potential adversary could ever conclude that a victory in any meaningful sense of the word would be attainable or worth the costs that would be incurrad. US strategy reflected in that policy requires that US plans and capabilities be structured to permit flexible employment of strategic nuclear forces. Thus, currently the US requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of retaliatory destruction, in a selective and measured manner, of Soviet political and military control targets, military forces both nuclear and conventional, war-supporting industry, and a broad set of industrial/economic targets.

The SSBN/SLBM programs described earlier provide for systems which are the most survivable elements of US strategic forces while at sea and thus provide an important and enduring element to our nuclear deterrent. These programs go beyond strict replacement of the present SSBN/SLBM force in that they are intended to maintain the survivability of US strategic submarines and provide increased capabilities for these survivable forces. Such steps to improve sea-based retaliatory capabilities are particularly important in view of the current

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strategic imbalance with the Soviet Union and the increased capability of Soviet strategic forces against US strategic forces -- especially US fixed landbased ICBMs.

The ELF program and the TACAMO improvement program would provide more secure, reliable communication links from the National Command Authorities to deployed fleet ballistic missile submarines. This would improve US command and control of these nuclear weapon systems while reducing their potential for detection by adversary antisubmarine warfare (ASW) forces.

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IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
TRIDENT Submarine (PE 11228N)										
Development	$ 842.9	60.5	[							
Production	$9040.0	436.2			]					
Construction	$ 773.6	112.7								
TRIDENT I (C-4) Missile (PE 11228N)										
Development	$3621.4	41.5								
Production	$4868.7	906.3		Deleted						
Construction	$ 100.7	5.4								TBD*
TRIDENT II Missile (PE 63371N)										
Development	$ 143.2**	198.7								
Production	$ -	-								
Construction	$ -	-	[		]					

* To be determined.
** Includes $19.9 and $16.0 Million respectively for USNS Vanguard.

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IV. FUNDING ("then year" $ in millions) (Continued)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
POSEIDON Procurement (UGM-73A)										
Procurement	$2397.8	18.7	[		Deleted				]	
Modification	$ 211.3	10.1	[						]	
TRIDENT I (W76) Warhead (DOE Program)										
Development	[				Deleted				]	
Production	[								]	
Fleet Ballistic Missile (FBM) Systems (PE 11221N)										
Development	$ 570.4	10.8	[						]	
Construction	$ 30.1	-								
Navy Strategic Communications (PE 11402N)					Deleted					
Development	$ 64.9	19.7								
Production	$ 139.8	95.4	[						]	

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IV. FUNDING ("then year" $ in millions) (Continued)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Extremely Low Frequency (ELF) Communications (PE 11401N)										
Development	$ 143.5	34.8	[							
Construction $	-	0	[		Deleted				]	
									]	

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to support US national security objectives and through the achievement of these objectives to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements that are genuinely stabilizing, equitable and verifiable. At the same time it is recognized that certain basic military capabilities, to include secure strategic retaliatory capabilities, must be maintained to deter attack on, or coercion of, the United States and its allies, to protect vital national interests, and to insure strategic stability.

US arms control policy emphasizes the necessity for the verification and equity of arms control agreements. This requires improved means for verifying compliance when national technical means (NTM) will not suffice.

The strategic forces modernization program is necessary to ensure the military capability needed to achieve national security objectives. Additionally, it will help redress the current strategic imbalance with the Soviet Union. The result will be a deterrent that is far more secure and stable than exists today. The program will also give us a force that is more resilient to Soviet attempts to negate our progress. This should, in turn, create the incentives necessary for the Soviets to respond seriously to proposals for meaningful and equitable reductions.

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As currently planned, the introduction of TRIDENT submarines begun in FY 1981 will result in: (1) a [deleted]. [Deleted].

B. Relation to Arms Control Agreements.

A comprehensive interagency review of US strategic arms control policy is currently underway. Pending completion of this review, the US has stated that it will not undertake any action that would undermine existing agreements as long as the USSR continues to do the same.

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1. SALT I Interim Agreement.

When the 1972 Interim Agreement expired, both the US and the USSR stated their intentions to take no action inconsistent or incompatible with its provisions as long as the other side does so, although neither party has a legal obligation to do so. The expired Agreement placed restrictions on the number of ballistic missile submarines and SLBM launchers that could be deployed by each side.* The US has dismantled two POLARIS submarines under these restrictions. For the Soviet Union, this has meant dismantling launchers on several older ballistic missile submarines to compensate for launchers on new DELTA and TYPHOON SSBNs.

2. SALT II Agreement.

The SALT II Agreement was signed in June 1979, but it has not been ratified. It is the position of this administration that SALT II will not be ratified in its present form.

SALT II included a Treaty which was to last through 1985, a Protocol which lasted through 1981, and a statement of principles to guide further strategic arms reduction negotiations.

The SALT II Agreement called for an initial aggregate ceiling of 2400 on strategic nuclear delivery vehicles (SNDVs)--

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* Under the Interim Agreement, the US was limited to 710 SLBM launchers on 44 SSBNs while the Soviet Union was limited to a maximum of 950 SLBM launchers on 62 SSBNs. However, in reaching these levels, the sides agreed to dismantle an older ICBM or SLBM launcher for each new SLBM launcher beyond specified initial thresholds -- for the United States 656; for the Soviet Union 750.

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ICBM launchers, SLBM launchers, air-to-surface ballistic missiles (ASBMs) capable of a range in excess of 600 kilometers, and heavy bombers -- which were to be reduced to 2250 by the end of 1981. A subceiling of 1320 was placed on the combined total of MIRVed ICBM and SLBM launchers, MIRVed ASBMs, and air launched long-range* cruise missile carrying heavy bombers (AHBs). A second subceiling of 1200 was placed on the combined total of MIRVed ICBM launchers and SLBM launchers as well as MIRVed ASBMs. A third subceiling of 820 was placed on MIRVed ICBM launchers alone. Unlike the SALT I Interim Agreement, there were no separate limits on numbers of ballistic missile submarines under SALT II. At present, the US has a combined total of 2271 SALT-accountable strategic delivery vehicles (1975 of which are operational):** 1053 ICBMs (550 MINUTEMAN IIIs, 450 MINUTEMAN IIs, and 53 TITAN IIs), 648 SLBM launchers (128 POLARIS A-3s, 400 POSEIDON C-3s, and 120 TRIDENT C-4s), and 570 heavy bombers including a number of mothballed and cannibalized aircraft.*** Thus, the US is below the 2400 aggregate ceiling on launchers.****

The US made clear that the SALT II Agreement would not affect existing patterns of collaboration and cooperation with

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* Greater than 600 km.

** 2 POLARIS submarines have been dismantled, and 8 are still operational but have been removed from a strategic role. They are, however, still counted under SALT accountable totals.

*** These figures reflect the dismantlement of two POLARIS SSBNs and the conversion of 6 POSEIDON SSBNs to TRIDENT C-4s.

**** The Soviet Union with over 2500 strategic nuclear delivery vehicles (SNDVs) would have to dismantle or destroy over 250 SNDVs to get beneath the aggregate ceilings.

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its Allies, nor would it preclude cooperation in modernization. The US specifically stated that the transfer of weapons systems numerically limited by the SALT II Agreement was not necessarily precluded. Consistent with this position the UK Government plans to purchase sufficient missiles complete with multiple independently targetable re-entry vehicles (carrying British built warheads) on a continuing basis to maintain a force of 4 or possibly 5 new British built submarines that would replace the existing British POLARIS sea-based strategic missile force in the early 1990s.

3. TRIDENT and the Non-Proliferation Treaty (NPT).

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 114 other countries are parties, states:

> Each of the parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,....

Representatives of many non-nuclear weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to foreswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapons state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As part of the 1979 two-track TNF decision, NATO made a commitment

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to seek arms control negotiations with the Soviet Union on intermediate range nuclear forces. The US and the USSR began the negotiations on November 30, 1981, in Geneva, Switzerland. The US held intensive consultations with its Allies in preparation for these negotiations.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapons states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint would weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

The TRIDENT SSBN/SLBM programs could be constrained by other existing arms control agreements. The terms of the Threshold Test Ban Treaty (TTBT) limit the US and the Soviet Union to nuclear tests of no more than 150 KT of explosive yield. The TTBT has

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been signed but has not been ratified by either party. Both the US and USSR have stated their intentions to abide by the yield limitation of the TTBT, pending ratification. [Deleted].

C. Effect on Current and Prospective Negotiations.

1. START Negotiations.

On November 18, 1981 President Reagan announced that the US will seek to negotiate substantial reductions in nuclear arms which would result in levels that are equal and verifiable. The timing of such negotiations -- to be called Strategic Arms Reduction Talks (START) -- is being discussed with Soviet representatives. The US START proposals will be based on fair-minded principles: substantial, militarily-significant reductions in force, equal ceilings and adequate provisions for verification. The approach to verification will be to emphasize openness and creativity -- rather than the secrecy and suspicion which have undermined confidence in arms control in the past.

2. Indian Ocean.

The increased operating room provided by the Indian Ocean might be of future use to US SSBN/SLBM forces and might

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become necessary if there were a major Soviet ASW breakthrough that imperiled the US ballistic missile submarine force or a Soviet abrogation of the ABM Treaty and major new efforts to build ABMs. Either Soviet move might require US SSBN deployments to launch points in the Indian Ocean complicating the Soviet defense problem. Any serious consideration of a "Zone of Peace" or "Nuclear Free Zone" in this area must consider this potentiality.

3. Comprehensive Test Ban.

The US has been engaged in Comprehensive Test Ban negotiations which were recessed in November 1980 without setting a resumption date. [Deleted].

D. Effect on Global and Regional Stability.

The TRIDENT submarine, missile, and related programs will significantly enhance the military capability and maintain the survivability of US SSBN/SLBM forces. TRIDENT SSBNs, POSEIDON SSBNs equipped with TRIDENT missiles, associated warhead programs, and related communications upgrade programs should assure that the US continues to maintain a credible, survivable sea-based strategic retaliatory force, even taking into account foreseeable developments in Soviet ASW capabili-

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ties. Because of the greater range of TRIDENT missiles, US strategic submarines have many times more available ocean operating area. This, combined with improvements in speed and quietness, would make the TRIDENT even more survivable against Soviet ASW forces than are existing SSBNs, which already possess an extremely high degree of survivability. No impending Soviet ASW development seems likely to pose a significant threat to TRIDENT.

By preserving the survivability and enhancing the capability of the US deterrent, our TRIDENT program, in conjunction with other force modernization plans, will increase the confidence of US Allies in the readiness and ability of the United States to react to the modernization of Soviet strategic systems and thereby prevent the USSR from obtaining a perceived or real strategic advantage that could undermine the credibility of the US deterrent. The deactivation of SSBN/SLBM bases in Europe removes the visible linkage that those bases currently provide with the strategic deterrent.

As US silo-based ICBMs become more vulnerable* to Soviet strategic weapons, US SSBNs could come to assume increasing importance in guaranteeing the secure US retaliatory capability necessary to deter nuclear attack upon this country or its Allies, and to help insure a fundamental strategic stability.

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* See ICBM ACIS for discussion of additional programs to increase US ICBM survivability.

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Consequently, the TRIDENT SSBN program, the TRIDENT I and II SLBM programs, and the associated SSBN communication improvement programs are essential to US security and to strategic stability.

Deployment of the TRIDENT II missile would complement other programs designed to compensate for US fixed ICBM vulnerability. The improved counter-silo and other hard-target capabilities likely to be offered by TRIDENT II will also be useful in meeting our requirements for a credible deterrence in the 1990s, and in providing a hedge against vulnerability of the other legs of the Triad. The survivability of the TRIDENT II SLBM would also enhance crisis stability insofar as it would contribute to an enduring retaliatory force that could inflict damage across the spectrum of Soviet targets.

E. Technological Implications.

Deployment of the TRIDENT II, and/or other US systems with hard-target-kill capabilities, could add incentives for the Soviets to reduce their ICBM vulnerability. By deploying more of their capability at sea, or on mobile ICBMs, they may improve Soviet strategic force survivability, which, in turn, may enhance strategic and crisis stability, although mobile ICBM deployments could also make verification more difficult. Whether the Soviets would actually respond to the TRIDENT II program with a new SLBM/SSBN or ICBM program would probably depend on a number of factors such as the speed of the US deployment, the cost of such changes to them, and the degree to which they perceived their silo based ICBMs to be threatened.

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F. Potential Interaction with Other Programs.

The strategic modernization program will guide the long term development of the US strategic forces. It will help redress the current strategic imbalance with the Soviet Union. The result will be a deterrent that is far more secure and stable than the present US nuclear force. This should, in turn, create better incentives for the Soviets to negotiate genuine arms reductions.

G. Verification.

[Deleted]. Although SSBNs and SLBM launchers are concealed for a part of their life and deployment cycles, they periodically emerge providing an opportunity to confirm existing operating numbers. The number of strategic submarines and SLBM launchers can be monitored by Soviet national technical means. Thus, neither the TRIDENT SSBN/SLBM nor other US SSBN/SLBM strategic offensive forces will cause verification problems.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The TRIDENT and POSEIDON submarine and missile systems should sustain for the foreseeable future the already high survivability of the US ballistic missile submarine force. The range of the TRIDENT I and II missiles will make available to US strategic submarines far more ocean operating area than is available to present POSEIDON SSBNs, and should present a formidable problem to foreseeable Soviet ASW forces. Their relatively high survivability,

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due to increased operating area, would be further enhanced by the anticipated improvement in quieting of TRIDENT submarines. The TRIDENT program will also add to the US retaliatory capabilities deployed to deter a suprise attack.

Deployment of TRIDENT submarines and missiles will [deleted]. Presently scheduled US SSBN/SLBM deployments could result in an increase of more than [deleted] SLBM nuclear warheads by 1987. [Deleted] are not inconsistent with the US policy of restoring the strategic balance and creating incentives for the Soviets to negotiate genuine arms reductions.

TRIDENT I missiles are considered retaliatory weapons and their deployment will enhance strategic stability. The TRIDENT II missile, potentially has increased hard-target-kill capability.

This potential for increased hard-target-kill capability might be viewed as offsetting whatever political and military benefits that the Soviets might otherwise secure by increases in their own hard-target-kill capabilities. Further, it is possible that improvements in US counter-silo capabilities could move the Soviets toward a more stable force configuration (e.g., ballistic missile submarine programs or mobile systems that would provide

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them with a more secure retaliatory force). Finally, an increased US hard-target-kill capability would provide the US with an improved and enduring wartime capability against hard targets in the USSR.

In summary, the SSBN/SLBM and associated communication programs analyzed here have beneficial arms control implications.

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AIRBORNE STRATEGIC OFFENSIVE SYSTEMS

I. INTRODUCTION

This arms control impact statement on Airborne Strategic Offensive Systems addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11113F	B-52 Squadrons and Associated Procurement
DOE Program	B83 Modern Strategic Bomb
64361F	Air Launched Cruise Missile (ALCM) and Associated Procurement
DOE Program	The ALCM Warhead Program (W80-1)
64738F	Protective Systems (B-52)
64226F/11126F	B-1B Bomber

These programs are analyzed together because they each would contribute to the continued viability of the air-breathing element of the US strategic Triad; consequently, their arms control implications are likely to be similar. Continuous modernization of the airborne component of US strategic forces is intended to maintain the effectiveness and credibility of the US strategic nuclear deterrent. Analysis of these major programs in concert is necessary

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to gain full understanding of their arms control implications, and to reflect developments in Soviet air defense capabilities.

II. PROGRAM DESCRIPTIONS

A. B-52 Squadrons and Associated Procurement (PE 11113F).

This program element consists of several major projects to maintain the combat effectiveness of the B-52 strategic bomber force against projected enemy threats of the 1980s. The purpose of this program element is to fund the B-52 operation, to develop the B-52 cruise missile carrier modifications and to evaluate and develop the weapon system upgrades necessary for maintaining the viability of the B-52 weapon system throughout the coming decade. These extensive modifications are designed to improve the aircraft's reliability and maintainability, upgrade the bombing navigation system for launching cruise missiles, and reduce weapon system support costs. These projects are described below.

The B-52 Aircraft Modernization Program (AMP) is designed to transition the B-52G/H force from a penetration to a cruise missile carriage mission. The following items are considered minimum requirements for this program: [deleted]. During [deleted] all major subsets of the AMP will be installed on flight test aircraft and fully involved in a combined development test and evaluation/initial operational test and evaluation program.

B-52H Cruise Missile Integration provides external and internal cruise missile carriage capability for the B-52H. This

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project will allow an initial operational capability (IOC) of FY 1986. In FY 1983/1984, test aircraft modification is to be completed, and missile launch will be accomplished. It is expected that the necessary data to start the aircraft modernization program will be obtained and the project completed.

B. B83 Modern Strategic Bomb.

The B83 bomb is being developed to enhance the effectiveness of the strategic nuclear gravity bomb stockpile. The B83 would upgrade the capability of US strategic aircraft to deliver weapons [deleted] allowing US tactical and strategic aircraft the option of delivering their weapons while [deleted].

The B83 provides greater flexibility in targeting and employment. It also is designed to be effective against hardened Soviet ICBM silos and launch complexes, command, control and communication installations, and nuclear storage sites. The B83 [deleted] incorporates improved safety and security features. [Deleted]. A modern parachute design will permit the B83 to be dropped at high speed from very low altitudes. The parachute is designed to withstand the shock of weapon delivery at transonic and supersonic speeds.

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The B83 incorporates improved safety and security features. It is one-point safe by the present criterion* and would be protected by modern permissive action link (PAL) systems,** as well as design features which include [deleted]*** non-violent command disable options.**** Insensitive high explosive in the B83 provides significant protection against accidental detonation of the high explosive and thereby decreases the probability of the dispersal of nuclear materials.

[Deleted].

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* One-point safe means that the probability of achieving a nuclear yield greater than four pounds of TNT equivalent shall not exceed one in one million in the event of a detonation initiated at the single most sensitive point in the high explosive system.

** A permissive action link is a coded switch which serves as a mechanistic supplement to the administrative controls exercised over nuclear weapons employment. When installed they make weapon-enabling, or access to the weapon itself, dependent upon code possession.

*** [Deleted].

**** The command disable feature cannot be activated until a code is inserted. [Deleted].

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TABLE 1: Cumulative B83 Warhead Deliveries

(Projected)

[Deleted]

C. Air-Launched Cruise Missile (ALCM) and Associated Procurement (PE 64361F).

The ALCM is a small, unmanned, long-range, accurate, self-propelled weapon delivery vehicle which -- in contrast to ballistic missiles -- has an air-breathing engine and is continuously powered through the atmosphere using aerodynamic lift. It incorporates technological advances in a number of areas, including lightweight, highly efficient turbofan engines, miniaturized electronics, modern nuclear warhead design, and advanced guidance systems. The Department of Defense FY 1983 budget plan contains funds for the completion of ALCM development and the continuation of associated procurement programs. B-52H aircraft are being modified to carry up to eight ALCMs internally on an enlarged rotary launcher and twelve externally on two new, large pylons mounted under the wings. The B-52G bomber is being modified to carry twelve ALCMs externally. The B-1B bomber will be capable of carrying up to 22 ALCMs.

The ALCM will provide the bomber force with a nuclear-armed air-to-ground missile which can be launched from inside or outside enemy air defenses. It will increase targeting and routing flexibility and reduce bomber exposure to air defenses. Because of its performance characteristics, flight profile, and penetration mode, the cruise missile will present Soviet air defenses with a

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more diversified threat, thereby preventing the Soviets from concentrating their resources on any one system. The high accuracy of the ALCM will increase the air-breathing forces' retaliatory capabilities against a broad spectrum of targets, including hard targets. ALCMs will also have excellent potential to deny the Soviets [deleted].

Current plans for deployment of ALCMs are in an evolutionary stage. At this time, [deleted] B-52Gs and [deleted] B-52Hs are planned for modification to carry ALCMs. The B-1B will be capable of carrying ALCMs. Initially, 12 ALCMs will be loaded externally, but by the late-1980s eight additional ALCMs per B-52, loaded internally on a rotary launcher, could replace the current complement of gravity bombs and short-range attack missiles. The first conversion of a non-test B-52G as an ALCM carrier was completed in September 1981. An IOC of one B-52G squadron equipped with 12 external ALCMs each and the offensive avionics system update is projected for December 1982. The ALCM operational and technical characteristics are summarized in Table 2.

D. W80-1 ALCM Warhead (DOE Program).

The W80-1, [deleted] will be used for the Air Launched Cruise Missile. The W80-1 will incorporate an insensitive high explosive and other improved safety and command and control features. [Deleted] the W80-1 would improve the effectiveness and flexibility available

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TABLE 2: ALCM Operational and Technical Characteristics

	DEVELOPMENT ESTIMATE	APPROVED PROGRAM	CURRENT ESTIMATE
Operational Characteristics (AGM-86B)			
1. Range: System Operational (km) A/			
2. Speed (Mach): a. Maximum Penetration		[Deleted]	
b. Cruise B/			
Technical Characteristics (AGM-86B)			
1. W80-1 Yield (KT)		[Deleted]	
2. Air Vehicle: a. Weight (lbs.)	N/S C/	N/S	[Deleted]
b. Length (in.)	N/S	N/S	[Deleted]
c. Diameter (in.)	N/S	N/S	[Deleted]

A/ System Operational Range takes into account all operational limitations of the system to effectively engage the target (operational fuel, allowance for indirect routing, speed, and altitude variations).
B/ Speed used to achieve System Operational Range.
C/ Not specified.

to the National Command Authority.

[Deleted].

<u>TABLE 3: Cumulative W80-1 Warhead Deliveries (Projected)</u>.

[Deleted]

ALCM

E. <u>Protective Systems (PE 64738F)</u>.

The purpose of the Protective Systems program is to develop, test and evaluate new countermeasures equipment for strategic aircraft. The FY 1983 program will include funding for: [deleted]

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[deleted] derived from these developments will help ensure continued mission effectiveness of the bomber force through the 1980s and 1990s.

F. B-1B Bomber (PE 64226F/11126F)

The B-1B bomber will be a new strategic weapon system able to perform as a penetration bomber, a cruise missile launch platform, and a conventional bomber in either a tactical or strategic role. The aging B-52s are judged as losing their ability to penetrate Soviet defenses sometime in the late 1980s, and it is recognized that the bomber force can best realize its mission objectives by both being able to penetrate and to deliver ALCMs from a stand-off mode. The B-1B will provide a flexible, large-payload delivery aircraft capable of penetrating Soviet defenses well into the 1990s and which also will be capable of delivering ALCMs. These bomber systems capitalize on the ability to apply human judgment in real time throughout the full spectrum of conflict.

A modernized bomber force consisting of B-1Bs and Advanced Technology Bombers (ATB) will be built and deployed. Development will proceed simultaneously, with an initial operational capability for the B-1B in 1986, and for the ATB in the early 1990s.

III. STATED MILITARY REQUIREMENTS

A fundamental objective of US national security is the maintenance of secure strategic nuclear retaliatory forces which

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could absorb any first strike and respond with an attack of such unacceptable proportions that any potential aggressor would be deterred from attacking the US or its allies. In order to accomplish this fundamental objective, the US relies on the flexible, redundant, and diverse capabilities provided by a mix of strategic delivery vehicles: land-based intercontinental ballistic missiles, submarine-launched ballistic missiles, and long-range manned bombers. This strategic force structure severely complicates Soviet offensive and defensive planning and provides a hedge against Soviet technological breakthroughs or the catastrophic failure of any one element of the Triad to perform its assigned wartime missions. The complementary and mutually reinforcing character of these strategic forces enables US officials to maintain a high level of confidence in the US strategic deterrent posture. The airborne element of US strategic forces, moreover, possesses advantages which are not offered by the other legs of the Triad.

Current US policy is to deter nuclear war by assuring that, whatever the level of aggression contemplated, no potential adversary could ever conclude that victory in any meaningful sense of the word would be attainable or worth the costs that would be incurred. US strategy reflected in that policy requires that US plans and capabilities be structured to permit flexible employment of strategic nuclear forces. Thus, current US strategy requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of retaliatory

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destruction, in a selective and measured manner, of Soviet political and military control targets, military forces both nuclear and conventional, war-supporting industry, and a broad set of industrial/economic targets.

The programs described in this arms control impact statement represent a comprehensive and sustained effort to maintain the effectiveness of the airborne strategic offensive component of the Triad, and to increase the diversity of these forces with the introduction of long-range, air-launched cruise missiles.

The US intends to rely on a mixed force of penetrating bombers and stand-off bombers with cruise missiles to ensure the effectiveness of the air-breathing forces against future Soviet air defenses. These Soviet defenses are not limited by current arms control agreements and are expected to include large numbers of low-altitude-capable, quick-reaction SAMs and look-down/shoot-down interceptors integrated with an advanced Soviet AWACS capable of vectoring interceptors to targets.

The US is continuing the research and development of more advanced long-range cruise missiles to offset expected improvements in Soviet air defenses. These include R&D and technology programs to improve cruise missile performance throughout the 1980s and beyond.

The Defense Department has projected a requirement that [deleted] B-52G [deleted] be equipped to carry 12 cruise missiles per aircraft and [deleted] B-52H [deleted] be equipped to carry up to 20 ALCMs

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per aircraft. The B-1B will be able to carry up to 22 ALCMs. This combination should contribute to the continued viability of the air-breathing forces in the threat environment postulated for the next ten to 15 years. In order to meet the potentially more demanding technological and mission requirements generated by projected improvements in the lethality of Soviet air defenses, the Defense Department is continuing to develop a new manned penetrating bomber for deployment in the early 1990s.

The introduction of long-range cruise missiles will improve the target coverage and routing flexibility of the strategic bomber force. The ALCM's effective stand-off range permits launch well outside the envelope of current Soviet air defenses, thereby reducing bomber mission profile requirements for high-speed low-altitude penetration. The ALCMs, moreover, have considerable potential for improving strategic bomber force effectiveness in the penetrating role by providing a capability for local exhaustion, saturation and leakage through Soviet low-altitude area and point defense. Depending on mission requirements, ALCMs could also increase recoverability of bomber assets -- which could contribute to the reconstitution of an enduring reserve force for use in a post-attack environment.

The extreme accuracy of the ALCM and the modernization of gravity weapons should also contribute to overall US force effectiveness and flexibility by improving bomber force capabilities against the increasing hardness of the Soviet target base. The ALCM's combination of yield and accuracy could make it a

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flexible weapon for selective attacks against a wide range of non-time-urgent military targets.

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IV. FUNDING ("then year" $ in millions)

	FY 81& Prior	FY 82	FY 83 (est)	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
B-52 Squadrons and Associated Procurement (PE 11113F)										
Development $	[			Deleted			]	] N/A	N/A	
Production $	[									
B83 Modern Strategic Bomb (DOE Program)										
Development $	[			Deleted						]
Production $	[									]
Air-Launched Cruise Missile (ALCM) and Associated Procurement. (PE 64361F)										
Development $	[			Deleted					]	
Production $	[								]	

IV. FUNDING (Con't) ("then year" $ in millions)

	FY 81& Prior	FY 82	FY 83 (est)	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
The ALCM War-head Program (W80-1) (DOE Program)*										
Development $										
Production $										
B-52 Protective Systems (PE 64738F)										
Development $	[									
Production $	[			Deleted			]			
B-1B Bombers (PE 64226F/11126F)							]	N/A	N/A	
Development $	[									
Production $	[			Deleted						]
										]

* Funding not available N/A

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to support US national security objectives and through the achievement of these objectives to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements that are genuinely stabilizing, equitable, and verifiable. At the same time, it is recognized that certain basic military capabilities, to include secure strategic retaliatory capabilities, must be maintained to deter attack on, or coercion of, the United States and its allies, to protect vital national interests, and to insure strategic stability.

US arms control policy emphasizes the necessity for the verification and the equity of arms control agreements. This requires improved means for verifying compliance when national technical means will not suffice.

The strategic forces modernization program is necessary to insure the military capability needed to achieve national security objectives. Additionally, it will help to redress the current strategic imbalance with the Soviet Union. The modernization of the B-52, the procurement of the B-1B, the deployment of air-launched cruise missiles, and the development of advanced aircraft technologies contribute to the continued viability of the bomber element of the Triad.

B. Relation to Arms Control Agreements.

A comprehensive interagency review of US strategic arms

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control policy is currently under way. Pending completion of this review, the US has stated that it will not undertake any action that would undermine existing agreements as long as the USSR continues to do likewise.

1. The SALT II Treaty.

The SALT II Treaty was signed in June 1979 but it has not entered into force pending ratification. It is the position of this administration that SALT II will not be ratified in its present form.

The provisions of the SALT II Agreement included a 1320 limit on the combined total of launchers of MIRVed (multiple independently targetable reentry vehicle) strategic ballistic missiles, MIRVed air-to-surface ballistic missiles (ASBMs), and heavy bombers equipped with cruise missiles capable of a range in excess of 600 km. Of this total of 1320, no more than 1200 could be launchers of MIRVed missiles and ASBMs. This would have allowed deployment of 120 heavy bombers equipped with cruise missiles capable of ranges greater than 600 km, without any off-setting reductions in launchers of MIRVed ballistic missiles and ASBMs; a larger number of aircraft equipped with long-range cruise missiles could be deployed if fewer than 1200 MIRVed ballistic missile launchers and ASBMs were deployed.

Under the provisions of the SALT II Agreement, any deployment of aircraft equipped with ALCMs capable of a range in excess of 600 km would be counted against the SALT overall ceiling limits and the sublimits on MIRVed missile launchers and heavy

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bombers equipped with cruise missiles. Aircraft on which long-range ALCMs are deployed would be counted as heavy bombers in both the 2250 aggregate ceiling for strategic delivery vehicles and the 1320 sub-ceiling on the total of MIRVed missile launchers, ASBMs and heavy bombers equipped for long-range cruise missiles. These limitations would have applied to all weapon-delivery (nuclear or conventional) ALCMs capable of ranges in excess of 600 km.

One additional element of the SALT II Agreement is the Joint Statement of Principles and Basic Guidelines for subsequent Negotiations on the Limitation of Strategic Arms. In the Joint Statement of Principles, both Parties agreed to pursue the following objectives in future negotiations, taking into consideration factors that determine the strategic situation: (1) significant and substantial reductions in the number of strategic offensive arms; (2) qualitative limitations on strategic offensive arms, including restrictions on the development, testing, and deployment of new types of strategic offensive arms and on the modernization of existing strategic offensive arms; and (3) resolution of the issues included in the Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms in the context of the negotiations relating to the implementation of the principles and objectives set out therein.

2. The Non-Proliferation Treaty (NPT).

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 114 other countries are parties, states:

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> "Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,..."

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon-state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As part of the 1979, two-track TNF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on intermediate-range nuclear forces. The US and the USSR began the negotiations on November 30, 1981 in Geneva, Switzerland. The US held intensive consultations with its Allies in preparation for these negotiations.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of

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the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

3. The Threshold Test Ban Treaty (TTBT).

[Deleted].

The programs analyzed in this ACIS are not affected by any other existing arms control treaty or obligation.

C. Effect on Current and Prospective Negotiations.

1. Strategic Arms Reduction Talks.

On November 18, 1981 President Reagan announced that the US will seek to negotiate substantial reductions in nuclear arms which would result in levels that are equal and verifiable. The timing of such negotiations -- to be called Strategic Arms Reduction Talks (START) -- is being discussed with Soviet representatives. The US START proposals will be based on fair-minded principles: substantial, militarily-significant reductions in force, equal ceilings, and adequate provisions for verification. The approach

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to verification will be to emphasize openness and creativity -- rather than the secrecy and suspicion which have undermined confidence in arms control in the past.

The development of cruise missiles, particularly ALCMs, and their launch platforms will provide the United States with a certain amount of leverage in future START negotiations. The possibility of a major increase in US strategic capabilities in the absence of SALT reductions, as suggested by cruise missiles and related force improvement programs, could enhance the chances of a balanced and verifiable agreement in future negotiations.

2. Comprehensive Test Ban Treaty.

The US has been engaged in Comprehensive Test Ban Treaty (CTBT) negotiations with the UK and the USSR. These negotiations were recessed in November 1980 without setting a resumption date. [Deleted].

[Deleted].

D. Effect on Global and Regional Stability.

The improvements envisaged for US airborne strategic

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offensive forces should contribute to crisis stability. The upgrading of B-52 avionics systems, the deployment of ALCMs, the procurement of B-1B bombers, and the continuing development of advanced aircraft technologies will help to maintain the effectiveness of the US airborne strategic offensive forces in the face of improving Soviet air defenses. Since either penetrating bombers or stand-off aircraft equipped with long-range cruise missiles take at least several hours after takeoff to deliver their weapons on target, such forces clearly are not a first-strike (disarming) threat against the USSR. Their considerable retaliatory capability enhances deterrence, while their slowness of delivery makes them inappropriate for use in any attack against time-urgent hard targets in the Soviet Union.

At a time of fixed-silo ICBM vulnerability, the strategic bomber contribution to US retaliatory capabilities has become even more important. They could greatly complicate the Soviets' already formidable air defense problem. Systems based on advanced technologies will enhance the deterrent value of the airborne element of the Triad and thus will have a positive effect on global and regional stability. ALCMs and related programs, by helping to assure the retaliatory capability of the bomber force, will contribute to strategic and crisis stability.

E. Technological Implications.

The United States possesses an advantage in advanced cruise missile technology, with an estimated lead of five or more years over the Soviet Union. ALCM is not a wholly new type of

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weapon; it represents the integration of a series of improvements in a number of technologies. Nevertheless, development of small highly accurate, long-range cruise missiles with small, high-yield-to-weight nuclear warheads would present formidable technical obstacles to states other than the current nuclear weapon states over the next few years.

If they believed it necessary, the Soviets could respond to US deployment of ALCMs in one or more of the following ways: (1) increasing efforts to deploy a defense against both cruise missiles and their associated launch platforms; (2) accelerating their development of a modern cruise missile capability; (3) upgrading their overall existing strategic offensive systems.

The Soviets could respond to US ALCM and associated bomber programs by accelerating their present modernization of low altitude air defenses. The Soviet SA-10 surface-to-air missile [deleted]. Interceptors with a look-down/shoot-down capability designed to operate with a possible Soviet counterpart to the US AWACS* [deleted]

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* These interceptors if deployed in large numbers together with the AWACs will have [deleted].

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[deleted].

The Soviet Union can also respond to the US ALCM program by developing, testing, and deploying long-range cruise missiles and suitable carrier aircraft. It is more likely that the development of a long-range Soviet cruise missile would be in response to Soviet military requirements and not in reaction to the US deployment of ALCMs. [Deleted]

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[deleted]. The Soviets might well be attracted [deleted] could narrow the US lead in force loadings and improve their overall capability against US targets. [Deleted].

Several US NATO allies have expressed interest in a long-term program of cooperation to develop a stand-off missile for the late 1980s/early 1990s for the defense of Western Europe. The US rejected Soviet attempts to include a non-transfer provision in the SALT II negotiations regarding cruise missiles and other systems limited by the Agreement. A generalized non-circumvention provision was agreed to by the US. The US has previously assured the NATO allies that the SALT II Agreement would neither affect existing patterns of cooperation between the US and its allies, nor preclude cooperation in modernization.

Development of cruise missiles by other nations is likely to be influenced more by internal considerations of strategy, politics, economics, and technology than by prestige considerations, or US actions or inaction. [Deleted]. The United Kingdom has shown interest in long-range cruise missiles as well.

Development of small long-range cruise missiles could present formidable technical obstacles to many other states, and especially developing countries, over the next few years. Although

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the aerodynamic design and turbofan engine technology are within the technological state-of-the-art for some developed countries, the fabrication of small, lightweight nuclear warheads and the microminiaturization of computer systems would require considerable technological sophistication and economic resources. For countries, however, who intend to use cruise missiles for less demanding missions, the development of relatively unsophisticated cruise missiles could be a more practical alternative.

F. Potential Interaction With Other Programs.

The strategic modernization program will guide the long-term development of the US strategic forces. It will help redress the current strategic imbalance with the Soviet Union. The result will be a deterrent that is far more secure and stable than the present US nuclear forces. This should, in turn, create better incentives for the Soviets to negotiate genuine arms reductions.

G. Verification.

Cruise missiles represent a class of weapons that raises troublesome verification problems, particularly over the longer term. As a result, as cruise missile programs and technology mature, future arms control agreements will require more detailed and stringent cooperative measures in order to assure adequate verification.

Cruise missiles, when compared to ballistic missiles, are smaller, fly lower, have smaller radar and infrared signatures, can use smaller, simpler and less easily identifiable launchers and support facilities and can be launched from a wide variety of

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air, sea, and land platforms. Their relatively low cost makes them feasible for the delivery of conventional as well as nuclear weapons. Cruise missiles of similar size and external configuration could have significantly different range capabilities, nuclear or conventional payloads, guidance systems, and missions. Each side would have to overcome difficult problems in order to be able to determine the particular fuel exhaustion range, payload, and launch platform of a given cruise missile. To the degree that such elements are or become the subject of constraints under arms control agreements, verification would become more complicated.

In contrast with U.S. efforts to monitor Soviet cruise missile programs, the open US society affords the Soviets considerable advantages in monitoring ALCM development, production, and deployment. The problem of verifying compliance with limits on ALCM carriers is not insurmountable. Many opportunities for monitoring an adversary's cruise missile program over a length of time would exist. Some testing of ALCMs on designated aircraft would be necessary before they could be deployed confidently, thereby allowing opportunities for identifying cruise missile carriers. These judgments are based on the assumption that [deleted] current US national technical means continue to be available in the future.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

In the face of improving Soviet air defenses, the procurement of ALCMs and the B-1B while developing advanced technologies is necessary to maintain the effectiveness of the strategic

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bomber force. The programs described in this statement will improve US retaliatory capabilities and thus strengthen deterrence, crisis stability, and create incentives necessary for the Soviets to respond seriously to US proposals for meaningful strategic arms reductions. At the same time, the strategic bomber force clearly will pose no first-strike threat to USSR strategic forces.

The introduction of ALCMs on B-52s [deleted]. Such increases in US strategic weapons might be perceived as contravening US arms control objectives of reducing nuclear weapon stockpiles. These increases, however, must be seen in the light of the need to maintain adequate military capability to execute the national strategy and achieve US national security objectives, to correct the existing strategic force imbalance, and to restore strategic stability. These programs are consistent with US arms control policy.

The Soviets might respond to US ALCM deployments in a variety of ways, including: (a) further improvements to their air defense system; (b) acceleration of their strategic weapons build-up beyond the scope of present plans; (c) increased willingness to pursue negotiated arms limitations; or (d) some combination of the above. However, without off-setting adjustments in US forces, a US decision unilaterally to restrict cruise missile deployment and

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new bomber procurement would lead to US strategic forces that were not capable of supporting US national security objectives.

Programs to ensure the continued effectiveness of the airborne strategic offensive force support US arms control and national security goals of deterring nuclear war or coercion, and maintaining international stability through the preservation of a credible threat of assured retaliation. These programs contribute to the reliability, survivability, and penetrativity of the air-breathing element of the strategic Triad and are consistent with US arms control objectives.

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SPACE DEFENSE

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
64406F	Space Defense Systems (Anti-Satellite)
63438F	Satellite Systems Survivability
63428F	Space Surveillance Technology
12424F	SPACETRACK and Associated Procurement
62301E	Strategic Technology
12450F	Space Defense Operations

The Space Defense Systems (Anti-Satellite) program is developing alternative methods of destroying objects in space. The Space Surveillance Technology program and the SPACETRACK program would provide the surveillance, tracking, prediction, attack assessment, warning and targeting capabilities necessary for an anti-satellite (ASAT) capability. The other programs are directly related to the development of a US space defense capability. The Air Force Satellite Systems Survivability program would provide the technology for both active and passive satellite system defense measures. The Defense Advanced Research Projects Agency (DARPA) Strategic Technology program will identify the feasibility of technology for improved space surveillance and

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anti-satellite capabilities through application of [deleted]. The Space Defense Operations program would procure the necessary operations and maintenance support facilities given a decision to deploy an operational ASAT capability. The Space Surveillance Technology and the SPACETRACK programs also could contribute to US anti-satellite monitoring capabilities. The overall capability of the United States to defend its own and nullify other nations' objects in space will be determined by these programs together. Hence, their arms control implications should be analyzed in the aggregate.

II. PROGRAM DESCRIPTIONS

The Space Defense Systems Program (SDSP) effort involves four functional areas: (1) anti-satellite systems; (2) space systems survivability; (3) space surveillance systems; and (4) command and control. The programs described below would provide the anti-satellite systems, the satellite and satellite control station survivability measures, the capabilities for detecting and tracking, mission assessment, and, in conjunction with the Commander-in-Chief, Aerospace Defense Command (CINCAD) Space Defense Operations Center (SPADOC), command and control for targeting the ASAT system.

A. <u>Space Defense Systems (PE 64406F).</u>

Under this program, the Air Force has examined alternative non-nuclear methods of destroying objects in space; each has certain advantages and disadvantages. [Deleted]

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[deleted] satisfying near-term US requirements. The two major projects of the Space Defense Systems Program are discussed below.

1. Miniature Systems.

[Deleted]

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* Altitudes of satellites are measured from mean sea level.

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[deleted]. Typical system characteristics are shown in TABLE 1. [Deleted] is shown in FIGURE 1.

Following competitive design review, a contract was awarded in September 1977 for full scale development and ground testing of prototypes [deleted]. Ground testing of the [deleted] will start in [deleted]. Manufacture of flight test hardware will also begin, continuing [deleted]. During [deleted] qualification testing on the [deleted] will be finished. If directed by the Secretary of Defense, the [deleted]. A total of [deleted] ASAT missiles is proposed for procurement through [deleted]. A target initial operational capability (IOC) for the [deleted].

Baseline planning for the [deleted] CONUS bases. [Deleted]. Full operational capability would require approximately [deleted] missiles. [Deleted].

[Deleted]

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TABLE 1: Typical Anti-Satellite Systems Characteristics.

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FIGURE 1:.

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[deleted].

Conventional ASAT subsystem designs and tests were [deleted] as a lower risk technology back-up [deleted]. The objective is to [deleted].

The conventional ASAT would provide a [deleted].

2. Advanced Systems.

This project examines [deleted] systems which could provide a high payoff in the future, on the assumption that the associated technology could be developed sufficiently. [Deleted]

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[deleted]. The FY 1982 and 1983 planned programs will continue to investigate [deleted].

[Deleted].

8. Satellite Systems Survivability (PE 63438F).

The objective of this program is to develop [deleted] devices that could be deployed on key US satellites to enhance their survivability in a hostile environment. The FY 1982 program includes: [deleted] (2) the integration of warning information from these sensors into the CINCAD Space Defense Operations Center; [deleted]

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[deleted] (4) the conceptual designs of survivable launch systems so that critical satellite capabilities could be [deleted] and [deleted].

The FY 1983 planned program will reinitiate earlier requirements such as: [deleted] and (2) [deleted] scheduled for initial operational capability in [deleted].

C. Space Surveillance Technology (PE 63428F).

This program seeks to improve the SPACETRACK detection and tracking system. The objective is to upgrade the capabilities of this component of the Department of Defense Space Detection and Tracking System (SPADATS) for ranges out to geosynchronous altitudes. The various R&D tasks involve improving tracking and prediction hardware and software, providing a capability for tactical assessment of satellite missions, developing an attack assessment and warning capability, and developing a capability for targeting US ASATs and evaluating the effectiveness of the attack. Following the completion of R&D, these capabilities would be integrated into the operational SPACETRACK system.

The FY 1982 program has continued design, development and space qualification of the Space Infrared Sensor (SIRE) payload [deleted]

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[deleted]. The objective of this project is to provide [deleted] and contribute to US [deleted] monitoring and surveillance capabilities. These efforts include the development of [deleted] for space object detection and tracking. [Deleted].

The 1983 planned program will continue to expand the near-term improvements. SIRE efforts will proceed with [deleted] will be computed and analyzed, leading to a [deleted].

D. SPACETRACK (PE 12424F) and Associated Procurement.

The SPACETRACK program will support satellite attack warning and verification, rapid alerting for [deleted]. The thrust of these efforts is to: (1) provide a Pacific Radar Barrier to furnish [deleted] (2) convert the Defense Advanced Research Projects Agency (DARPA) Maui optical site Space Object Identification Facilities to SPACETRACK for [deleted] (3) provide improved [deleted] and (4) provide a [deleted] globel Ground-based Electro-Optical Deep Space Surveillance (GEODSS) system that could detect and track satellites [deleted].

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Near term improvements include the integration of existing space tracking R&D assets into a coherent system, and the development of the ground-based electro-optical surveillance system to increase SPACETRACK detection and tracking altitude [deleted]. The operational network, when deployed, would consist of [deleted] sites around the world. This includes one in the continental United States with a planned IOC in [deleted].

The [deleted] planned program will continue deployment of [deleted] GEODSS sites with the IOCs of the remaining [deleted] scheduled through [deleted]. Final operational capability for GEODSS is planned for [deleted]. The FY 1983 planned program will [deleted].

E. Strategic Technology (PE 62301E).

This DARPA program includes two separate technology projects which could, if proved feasible, have direct application in support of the space defense mission.

1. High Energy Laser Technology.

This project examines the future [deleted]

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[deleted].

The FY 1982 and FY 1983 HEL programs will concentrate on three technology areas: [deleted]. In the first area, [deleted]. In the second area, [deleted]. The third area will continue in FY 1983 to concentrate on [deleted]. Pending FY 1982 budget action, the Air Force will address overall system issues. [Deleted].

2. Space Object Identification.

The space defense related goal of this project is to develop and demonstrate advanced techniques for high payoff capabilities in space object identification. The Compensated Imaging System is designed to obtain resolution of [deleted] to assist in determining [deleted]. This [deleted] will permit the development of new strategic defense concepts such as [deleted].

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F. Space Defense Operations (PE 12458F).

[Deleted] the ASAT capability being developed under the Space Defense Systems Program [deleted]. This program would [deleted] (1) a facility for testing, checkout and repair of the ASAT vehicles; (2) a training facility to maintain launch crew proficiency; and (3) additional anti-satellite system handling and launch facilities to be installed at selected locations. The FY 1982 and FY 1983 planned programs would [deleted]. It should be noted that procurement and completion of these facilities would depend upon [deleted] to provide an operational ASAT capability.

III. STATED MILITARY REQUIREMENTS

The United States' ability to utilize its military power continues to be increasingly dependent on the effective and reliable operation of various satellite systems; [deleted]. Space systems provide critical strategic and tactical support to military forces and political leaders in the areas of attack warning, navigation, surveillance, communications, intelligence and meteorology. [Deleted]. Although the US [deleted] maintain redundant

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capabilities in some systems not dependent on the use of space, the [deleted].

The Soviet Union began to test anti-satellite systems in [deleted]. They have [deleted] actually has been observed being tested [deleted].

Although [deleted]

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[deleted].

A [deleted].

The Soviets [deleted]

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* [Deleted].

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[deleted].

[Deleted]. (See the separate ACIS [deleted] for further information.)

[Deleted].

The US currently [deleted] did have a [deleted] system deployed at Johnston Island from 1964 until 1975. The system employed THOR boosters and [deleted] and operated [deleted] against low-altitude [deleted] targets only. The Johnston Island system was initially a response to Soviet threats to deploy orbital weapons of mass destruction. The system was deactivated because this

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threat was never deployed (and the Outer Space Treaty prohibited its employment), and because a low-altitude [deleted] would probably damage US satellites [deleted] as well as the targeted Soviet satellite. The US is also actively [deleted].

The Air Force ASAT system [deleted].

Other facets of the US space defense program seek to improve US satellite detection, tracking, assessment, and attack warning capabilities, and to develop and intagrate survivability technologies and techniques for satellites, launch systems, and ground control stations. While it is recognized that technological improvements cannot make space systams [deleted] it is possible [deleted] more difficult, more visible, more costly, and less certain of success.

To a lesser degree, the [deleted]

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[deleted].

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IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Space Defense Systems (PE 64406F)										
Development $	245.7	200.9	211.8	179.1	cont.	N/A	N/A	N/A	N/A	cont.
Production $							N/A			
Satellite Systems Survivability (PE 63438F)										
Development $	72.2	11.1	22.5	38.3	cont.	N/A	N/A	N/A	N/A	cont.
Production $							N/A			
Space Surveillance Technology (PE 63428F)										
Development $	171.1	23.7	40.3	46.6.	cont.	N/A	N/A	N/A	N/A	cont.
Production $							N/A			

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IV. FUNDING ("then year" $ in millions)

		FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
SPACETRACK (PE 12424F)											
Development	$	22.5	8.0	5.5	5.1.	cont.	N/A	N/A	N/A	N/A	TBD*
Production	$	58.6	20.2	4.0	cont.	cont.	N/A	TBD	N/A	N/A	TBD
Strategic Technology (PE 62301E)											
Development	$	58.1	46.6	44.7	59.8.	cont.	N/A	N/A	N/A	N/A	TBD
Production	$							N/A			
Space Defense Ops. (PE 12450F)											
Development	$	14.5	1.1	6.5	2.9	cont.	N/A	N/A	N/A	N/A	TBD
Production	$				32.8	cont.		TBD	TBD	TBD	

* To Be Determined.

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The arms control policy with regard to space defense is under review.

B. Relation to Arms Control Agreements.

The following existing legal obligations impose certain restraints on ASAT activities:

1. The Outer Space Treaty establishes a general norm of peaceful uses of outer space. Article III states that the space activities of States Parties to the Treaty shall be conducted "... in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding." Article IV prohibits the placement in orbit, installation on celestial bodies, or stationing in outer space of nuclear weapons or any other kinds of weapons of mass destruction. In addition, Article IX requires international consultations prior to any planned space activity or experiment if the State undertaking it has reason to believe such activity or experiment would cause potentially harmful interference with the peaceful space activities of others.

2. The Limited Test Ban Treaty prohibits the Parties to the Treaty from carrying out nuclear explosions of any kind in space.

3. Other international agreements extend specific protections to certain classes of satellites. The US and the USSR

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have undertaken express obligations not to interfere with each other's national technical means (NTM)* of verification under the ABM Treaty. Under the Direct Communications Link Improvement Agreement, both nations have confirmed their intention to take all possible measures to assure the continuous and reliable operation of the emergency satellite system; and under the International Telecommunications Convention, each party is obligated to avoid harmful interference with the radio services or communications of other parties.

4. In addition, [deleted].

5. Finally, the Convention on Registration of Objects Launched into Outer Space provides cooperative means to monitor some space activities. Parties to the Convention shall provide:

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* However, NTMs are not defined in any international agreement.

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(a) name of launching state or states; (b) an appropriate designation of the space object, or its registration number; (c) date and territory or location of launch; (d) basic orbital parameters, including nodal period, inclination, apogee, and perigee; and (e) general function of the space object.

None of these agreements would affect US development of potential space defense systems as long as the testing of such systems did not violate any of the above obligations. [Deleted].

C. Effect on Current and Prospective Negotiations.

1. General.

The US will continue to pursue an operational ASAT system [deleted] if an agreement constraining [deleted] space defense systems were reached, as a [deleted].

Overall, the US and the USSR are [deleted]. The US space program tends to deploy a [deleted]

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[deleted]. Therefore, US capability provided by space systems is [deleted].

Competition in ASAT systems would be costly to both sides. The Soviet [deleted] although it is [deleted]. Further, we believe that in the future, barring a [deleted] ASAT agreement, [deleted] and a capability to [deleted] satellites. The US [deleted] satellites. A US system [deleted]. On the other hand, the US would [deleted]. The US considers that a program [deleted] is not appropriate [deleted].

Although some measures can be taken to reduce satellite vulnerability, and some satellites are [deleted]

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[deleted] at present because [deleted]. Limits placed on [deleted] but the [deleted] would be a critical factor. Some measures to improve satellite survivability [deleted] very expensive. Some survivability measures [deleted]. Some countermeasures could protect satellites from harassment or trivial interference and could make such actions difficult to [deleted]. This would tend to raise the threshold of [deleted] and could, therefore, raise the political risk of such actions.

An ASAT competition would pose a considerable threat to critical satellites on both sides, creating a situation in which neither side could rely with confidence on unprotected space systems [deleted]

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[deleted].

2. Former ASAT Negotiations.

In March 1977, the US proposed to the Soviets the formation of a joint working group to discuss arms control limitations on anti-satellite systems. The first round of talks was held in Helsinki on June 8 - 16, 1978. The discussions were exploratory in nature to determine the possibility and basis for subsequent negotiations on limiting certain activities directed against space objects and systems for conducting such activities. US and Soviet delegations were convened in Bern, Switzerland on January 23 to February 16, 1979 and again April 23 to June 17, 1979 in Vienna to continue negotiations. The US proposed at that time [deleted].

At this time, the future of ASAT negotiations depends, in part, upon the results of the US ASAT policy review. No agreement would be acceptable that would either place the US in an inferior position vis-a-vis the Soviet Union or contain a non-verifiable position.

3. Issues for Consideration.

The definition of what comprises an ASAT system could

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have a bearing on other US space programs, to the extent that constraints on [deleted] system.

For example, [deleted] would provide the necessary [deleted] system. Since [deleted] now provides, and will continue to provide vital US capabilities to [deleted] programs, any constraint which inhibited the continued operation and improvement of this system would be detrimental to US space efforts. That [deleted] happens to [deleted] does not imply that is purpose is solely, or mainly, to perform that function. One US negotiating objective in any US-Soviet ASAT talks would be to avoid undesirable [deleted] space programs. [Deleted] and thus may complicate negotiations.

The Space Transportation System is designed to place payloads into earth orbit, inspect and repair compatibly engineered satellites in orbit [deleted] and retrieve US or other cooperative space systems [deleted] for return to earth. [Deleted].

[Deleted]

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[deleted].

D. Effect on Global and Regional Stability.

It is believed that the likelihood of [deleted]. However, the likelihood of [deleted] at least initially.

A Soviet advantage in ASAT capability could contribute to strategic and regional instability. [Deleted].

The effects of ASAT deployments by both sides on strategic stability could be lessened by two factors. First, [deleted]

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[deleted] satellite capabilities on either side probably would be degraded or negated in a major nuclear attack even in the absence of [deleted] because launch facilities and ground stations for satellite control and read-out could be high on the attack priority list. [Deleted]. Second, if one side were contemplating only a limited strike, there could be some incentive to spare satellites. An attack on some satellites in the absence of enduring or reconstitutable assets would make attack assessment and associated communications more difficult, and therefore might raise the risk of a massive, rather than a limited retaliation. Such an attack could also complicate post-attack communications between the two sides.

E. <u>Technological Implications</u>.

A US space defense program may have a technological impact on Soviet satellite and anti-satellite programs, but it appears unlikely that other countries with space programs would devote resources to anti-satellite development in the near future, or would have the incentive to do so even if they possessed the necessary technology.

While the present [deleted] is technically [deleted] relative to the [deleted] technology being developed [deleted] in the research phase. Each side currently has only a small number of critical operational satellites [deleted]. Although this number is expected to increase

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to perhaps [deleted] the number will still be relatively small. Therefore, [deleted] could have a [deleted] of US satellites.

To offset future US anti-satellite systems, the Soviets might elect to increase the [deleted] of their own satellites. The disadvantages to them would be similar to those of the US: added cost, [deleted] and the possibility that [deleted] might have only short term effectiveness.

The scope and pace of Soviet anti-satellite programs probably would depend on Soviet assessment of US ASAT and satellite survivability programs and of their ability to compete with the US in [deleted] system development. Depending on their estimates, the Soviets [deleted]. On the other hand, in the absence of [deleted]. In the latter case, they might attempt to: [deleted]

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[deleted].

The Soviets might also combine [deleted] programs. Such a course could, in Soviet thinking, [deleted] during the SALT negotiations, and [deleted]. The SALT analogy could be somewhat limited, if the US goal were to [deleted] rather than (as in SALT II) to limit the numbers and capabilities of weapon systems. Hence, if the Soviets combined [deleted] they could risk forfeiting these improvements. They might also risk a sharper US reaction such as possible acceleration of US space defense programs, (including increased survivability measures for hardening of critical satellites and [deleted].

F. Potential Interaction with Other Programs.

The potential for use of [deleted] for space defense purposes is being followed in the Space Defense Systems Program. For example, the [deleted] program is actively investigating the potential application of [deleted].

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DOD is also investigating defenso against [deleted] of satellite components.

In the Strategic Technology/High Energy Laser Program (PE 62301E), described in Section IIE, DARPA has defined conceptually [deleted].

Advanced space technology which could provide the base for development of a [deleted] could also provide the necessary technology for an [deleted] system.** Because of this interrelationship, an agreement which [deleted] could also [deleted]

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* Additional details of the service and the DARPA directed energy programs are included in a separate ACIS entitled "Directed Energy Programs."

** The development, testing and deployment of sea-based, air-based, space-based and mobile land-based ABM systems and their components are prohibited by the ABM Treaty. It bans all deployment of ABM systems and components (missiles, launchers, and radars) beyond those allowed by Article III. Should ABM systems based on other physical principles and including components capable of substituting for ABM missiles, launchers, or radars be created in the future, limitations on such systems and their components would be subject to discussion in accordance with the ABM Treaty provisions for consultation and agreement, and/or amendment.

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[deleted].

G. Verification.

The [deleted] agreement makes our ability to verify compliance with such an agreement particularly important. Preliminary studies indicate that [deleted] in the monitoring of such an agreement. [Deleted]. The preliminary judgement of the intelligence community is that, [deleted].

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* [Deleted].

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A principle method of verifying a [deleted]. Thus, US monitoring capabilities [deleted]. Our ability to monitor [deleted] agreement is reached or not.

Some types of [deleted] systems (e.g., [deleted] could be [deleted].

The Soviets also may have concerns over the verification of limits on US [deleted] programs. They may be concerned that the US [deleted] they may have similar concerns as the US about the [deleted] that exist or might be developed for other purposes; and they may have comparable concerns about the use of [deleted].

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VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Since the Soviets currently possess an operational ASAT and the US does not, the arms control policy with regard to space defense is under review.

The US Space Defense program:

-- [deleted]

-- [deleted]

-- indicates US determination not to permit a Soviet anti-satellite system monopoly;

-- provides a [deleted] agreement is reached;

-- is subject to revision depending on decisions regarding ASAT negotiations;

-- is consistent with US obligations under the Outer Space Treaty, the UN Charter, the ABM Treaty, the International Telecommunications Convention, the Convention on Registration of Objects Launched into Outer Space, and the Direct Communications Link Modernization Agreement;

-- would not adversely affect other arms control negotiations;

-- [deleted]

-- [deleted]

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[deleted]

-- is not likely to lead to third-country development of anti-satellite systems; and

-- [deleted].

Preliminary studies suggest that some potential provisions of a [deleted] arms control agreement would [deleted] but could require [deleted] as significant cost.

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BALLISTIC MISSILE DEFENSE

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
63304A	Advanced Technology Program (ATP)
63308A	Systems Technology Program (STP)

The Department of the Army is responsible for conducting a continuing research and development (R&D) program in ballistic missile defense (BMD)* within the constraints of the Anti-Ballistic Missile (ABM)* Treaty. The current US BMD R&D program is structured into two complementary and closely interrelated efforts, the Advanced Technology Program (ATP) and the Systems Technology Program (STP). These efforts are aimed at building the technological base, at both the component and systems level, to provide a wide range of options for possible strategic defense applications including the definition and demonstration of the defended options for MX basing included in President Reagan's Strategic Program.

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* ABM and BMD are used interchangeably. Generally, ABM is used when referring to the Treaty and BMD is used in the context of the existing US R&D program.

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II. PROGRAM DESCRIPTIONS

Since the ABM Treaty was signed in 1972, the scope and direction of the BMD program have changed markedly. The SAFEGUARD System, undergoing deployment at that time, has been inactivated with the exception of the Perimeter Acquisition Radar (PAR) near Grand Forks, North Dakota.* (The PAR is now operated by the Air Force and used for SLBM early warning and ICBM attack assessment, though it remains an ABM radar for purposes of the ABM Treaty.) A follow-on BMD system prototype demonstration program was terminated in 1975. Also, 1975 saw the last US BMD interceptor flight tests. The current BMD program is aimed at reducing both the cost and the system development lead time, as well as improving the effectiveness of systems applicable to ICBM defense. Thus the program allows the US to keep abreast of advances in BMD technology while providing a hedge against possible Soviet ABM breakout. It also provides options for enhancing ICBM survivability and for defending other strategic targets. A pre-prototype demonstration program was initiated in 1980 and these efforts will be accelerated in FY 1983 in support of the overall Strategic Program.

A. Advanced Technology Program.

The Advanced Technology Program (ATP) is a broadly based research effort whose objectives are to provide the advanced tech-

* The system's components remain Treaty accountable unless dismantled in accordance with the agreed procedures for dismantling and destruction worked out in the Standing Consultative Commission.

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nological foundation for future BMD concepts, emphasizing approaches which could yield fundamental breakthroughs in BMD capabilities; and to provide the technological base for substantial improvements in nearer-term BMD systems. Significant research projects underway in FY 1983 are described below. (For a discussion of potential BMD applications of directed energy technologies, see the arms control impact statement on Directed Energy.)

One part of the ATP investigates advanced radar and optical sensors. Radar technology efforts emphasize increased resistance to nuclear blackout through use of shorter (millimeter range) wavelengths. Millimeter wavelength radars also promise improved resolution and greater accuracy in measuring target range, angle and velocity. In FY 1983, efforts to gather and analyze field test data would continue.

Efforts are also underway to define the potential of passive optics to detect and discriminate large numbers of objects in space. An optical data gathering device called the Designating Optical Tracker (DOT) that operates in the long-wave infrared (LWIR) part of the spectrum is in the process of being flown at Kwajalein. The DOT is launched by a sounding rocket and begins operating when it is above the atmosphere. Four tests have taken place (in December 1978, February 1980, September 1980, and June 1981); more are planned.

The Forward Acquisition Sensor (FAS) is another advanced development effort and is intended to investigate the use of a [deleted] in a BMD or early warning role. [Deleted]

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[deleted]. The FAS concept is a part of the overall effort leading to an integrated Overlay capability in the Systems Technology Program (see below).

A derivative of the FAS effort is the proposed Survivable Optical Forward Acquisition System (SOFAS), an application of BMD technology to augment ballistic missile early warning and attack assessment capabilities. [Deleted].

B. Systems Technology Program.

The Systems Technology Program (STP) is concerned with the integration of promising new technologies, the testing of new techniques, the determination of solutions to technical issues critical to the successful operation of potential BMD systems, and the prototyping and demonstration of new BMD systems. The STP exploits advances and breakthroughs achieved by the ATP and, concurrently, addresses those aspects of BMD research that require integrated testing of components and subsystems in as realistic

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an environment as possible.

The current thrust of the BMD STP effort is focused on two principal defense system concepts, Low Altitude Defense (LoAD) and Overlay defense. Both concepts, either individually or combined in a layered defense, offer options for improving US ICBM survivability and for countering continued Soviet threat growth. These concepts are described in the following paragraphs.

1. Low Altitude Defense (LoAD).

The LoAD effort is an accelerated pre-prototype demonstration program to support concepts for defense of hardened strategic targets. The original schedules called for Phase I of the LoAD pre-prototype demonstration (PPD) program, to validate the radar, data processor, and interceptor technology to be completed in [deleted]. As a result of [deleted].

[Deleted]. In addition, the develop-

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ment schedules for the major subsystems will also proceed on essentially the same schedule. There are activities which were required under the MX/MPS option, such as parallel MX and LoAD design, interface configuration control and development of the defense unit platform, that are no longer required. However, under the fixed silo defense option it will be necessary to [deleted].

2. Exoatmospheric Overlay Defense.

The STP has in recent years been investigating the potential of a multi-tiered, or layered, approach to ICBM defense. The high-altitude component, or overlay, in this conceptual system would feature long-range interceptors with non-nuclear warheads and optical, terminal-homing guidance systems to make exoatmospherio intercepts. Candidates for the low-altitude component include LoAD or other advanced terminal defense systems.

In a conceptual tactical configuration for an overlay system, a probe would be launched upon receipt of attack warning from a forward acquisition means such as ground-based early warning radars or satellite-borne infrared sensors. Optical sensors aboard the probe would acquire and track the threat complex and pass track data through a battle manager for assign-

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ment of interceptors. Each Overlay interceptor missile would be equipped with one or more small "kill vehicles" that [deleted] reacquire the specific reentry vehicles for intercept and non-nuclear kill (NNK). Current studies for the overlay system are being directed toward both the near-term threat and the more sophisticated far-term threat [deleted].

The Homing Overlay Experiment (HOE) is designed to resolve key development issues associated with exoatmospheric NNK and optical guidance and to demonstrate the intercept capability of a single kill vehicle using a LWIR terminal guidance system. The final two of four planned tests of the experimental HOE flight vehicle will take place at Kwajalein [deleted].

III. STATED MILITARY REQUIREMENTS

The scope of work outlined in the two complementary efforts within the overall US BMD R&D program has been structured to meet stated requirements and objectives, within the terms of the ABM Treaty: (1) to develop advanced BMD concepts, technology, and components to insure a technological capability to counter future ballistic missile threats, and (2) to continue to validate, in a systems context, BMD components which can be deployed for a variety of missions including defense of MX. Other objectives of the program include providing assistance in the evaluation of US strategic offensive forces and the assessment of Soviet BMD activity.

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The US BMD R&D effort is largely motivated by the threat posed by growing Soviet ICBM counter-silo capabilities and by the USSR's own continuing BMD development activities. The Soviets continue to deploy an improved ICBM force and to proceed with the development of new or modernized ICBMs. [Deleted].

Although the intelligence community continues to believe it unlikely that the Soviets will opt in the near term [deleted].

Although the [deleted]

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[deleted].

[Deleted].

[Deleted].

[Deleted]

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[deleted].

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IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion
Advanced Technology (63304A)					
Development $	1378.9	126.5	143.2	[deleted]	Continuing
Production $	N/A	N/A	N/A	[deleted]	N/A
Systems Technology (63308A)					
Development $	1080.6	335.6	727.3	[deleted]	Continuing
Production $	N/A	N/A	N/A	[deleted]	N/A

Funding for BMD for FY 1982 and following years reflects the increased emphasis being placed on system development and the reduction of deployment leadtimes.

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

A US BMD R&D program conducted within the terms of the ABM Treaty supports US arms control policy by keeping the US abreast of BMD technologies, thereby hedging against, and at the same time serving to discourage, any possible Soviet breakout from the ABM Treaty. It also provides future system deployment options, as announced by President Reagan, should the US conclude that this would be in its interest.

B. Relation to Arms Control Agreements.

The ABM Treaty is an agreement of unlimited duration which restricts ABM deployments and limits certain areas of ABM development.* The objectives of the Treaty are to curb the race in strategic defensive arms and to reduce thereby the incentive to increase the number or capabilities of offensive systems. The Treaty, which put a ceiling on ABM deployments, facilitated conclusion of the Interim Agreement limiting the number of fixed ICBM launchers and submarine-launched ballistic missile (SLBM) launchers on each side. The United States continues to be a party to the ABM Treaty. The Treaty is scheduled for review and a meeting will be held with the Soviets for this purpose sometime

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* Like other arms control treaties signed by the US, the ABM Treaty makes provision for withdrawal (in this case, upon six months notice) should either party decide that extraordinary events related to the subject matter of the Treaty have jeopardized its supreme interests.

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after October 3, 1982. The US Government's own extensive review of the Treaty will be completed prior to this meeting.

The ABM Treaty (as amended by the Protocol to the Treaty which was signed on July 3, 1974, and entered into force on May 24, 1976) permits each Party to have one limited ABM system with no more than 100 ABM launchers and no more than 100 ABM interceptor missiles at launch sites. This limited system may be deployed either within an area having a radius of 150 km and centered on the Party's national capital; or within an area at least 1300 km from the national capital, having a radius of 150 km and containing ICBM silo launchers. The US elected to deploy an ABM system centered on the ICBM field at Grand Forks. This system is no longer operational. The Soviets elected to deploy an ABM system centered on their national capital at Moscow. This system, [deleted] continues to be operational [deleted]. A Party may exchange its ABM system deployment area on the basis of the Protocol to the ABM Treaty of July 3, 1974, and in accordance with the procedures agreed upon in the Supplementary Protocol of October 28, 1976.*

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* The full title of this instrument, which was negotiated in the Standing Consultative Commission (SCC), is "Supplementary Protocol to the Protocol on Procedures Governing Replacement, Dismantling or Destruction, and Notification Thereof, For ABM Systems and Their Components."

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The ABM Treaty allows the development* and testing of fixed, land-based ABM systems and components at agreed test ranges (Article IV), but prohibits (Article V) the development, testing, or deployment of sea-based, air-based, space-based, or mobile land-based ABM systems or components, and the development, testing, or deployment of ABM interceptor missiles with more than one independently-guided warhead, launchers for launching more than one ABM interceptor missile at a time from each launcher, or automatic, semi-automatic, or similar systems for rapid reload of ABM launchers.

While the Treaty allows development and testing of fixed, land-based ABM systems or components based on other physical principles (such as lasers or particle beems) and including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, such systems or components may not be deployed under the terms of Article III and an agreed

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* The meaning of the term "development," as used in the ABM Treaty, is as follows:

> "The obligation not to develop such systems, devices or warheads would be applicable only to that stage of development which follows laboratory development and testing. The prohibitions on development contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or bread-board model." (As provided by Ambassador Gerard Smith to the Senate Armed Services Committee during its hearings concerning ratification of the ABM Treaty. For a more complete discussion, see Senate Armed Services Committee, Hearings on the Military Implications of the Treaty on the Limitation of Anti-Ballistic Missiles and the Interim Agreement on Limitation of Strategic Offensive Arms, 92nd Congress, 2nd Session, July 18, 1972, p. 377.)

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statement in connection with Article III, unless specific limitations on such systems and their components are discussed and agreement is reached to amend the Treaty.

The FY 1983 US BMD research and development program is consistent with the ABM Treaty. The program elements described in section II, above, will continue to be monitored to ensure their compliance with the terms of the Treaty.*

The existence of a BMD research and development program within the terms of the ABM Treaty, as a base from which a BMD system could be developed and deployed, contributes to the continued viability of the Treaty and to a favorable strategic negotiations environment by providing a hedge against Soviet abrogation of the ABM Treaty. In this sense, the US BMD program provides a disincentive for Soviet abrogation of the Treaty.

C. Effect on Current and Prospective Negotiations.

The next five-year review prescribed in the ABM Treaty will be held sometime after October 3, 1982, and the US is now formulating its position. At the previous review in 1977, the US and USSR reaffirmed their respective support for the Treaty. (Any substantive questions that arise regarding the ABM Treaty, including proposed amendments, may, of course, be raised at any time in the Standing Consultative Commission (SCC) established by Article XIII of the Treaty.) The FY 1983 US BMD R&D program should have no

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* For a discussion of the relationship of the ABM Treaty to systems developed for applications other than ballistic missile defense, see the arms control impact statements on Space Defense and Directed Energy.

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effect on other current and prospective arms control negotiations. [Deleted].

D. Effect on Global and Regional Stability.

Mutual adherence to the ABM Treaty by the US and USSR serves to enhance the deterrent for the US and its allies. A continuing US R&D program within the terms of the ABM Treaty enables the US to keep abreast of advances in BMD technology and thereby reduces the possibility of the Soviet Union gaining a meaningful advantage in BMD technology. Absent the US BMD R&D program, the prospects for Soviet advantage in BMD technology, or perceptions of Soviet advantage, could be increased with attendant negative implications for global and regional stability.

The FY 1983 BMD program has no perceptible effects on such issues as the nuclear threshold, crisis stability, escalation, collateral damage and aftermath effects, or the risk of accidental war, and hence is not destabilizing on any of these grounds.

E. Technological Implications.

As noted above, US BMD R&D helps reduce the risk of Soviet technological surprise in the BMD area. The BMD program also assists in the design and evaluation of US strategic offensive systems by contributing information on their penetrativity, and by furthering technological assessments of current and projected Soviet BMD capabilities. By making possible greater confidence in our understanding of the potential of BMD technologies, this program supports continued US adherence to the ABM Treaty, or, if

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necessary, helps identify those technologies and systems for which a Treaty amendment might be appropriate.

F. Potential Interaction with Other Programs.

BMD programs can interact with strategic offensive ballistic missile programs in two ways. BMD research will provide the technological base from which a system to defend ICBM sites could be developed to support a Presidential decision on deployment. A deployment decision could convince a potential attacker that any offensive buildup designed to produce a disarming first-strike capability against ICBMs would be pointless. On the other hand, ABM deployments could stimulate an offense-defense competition, including the development and deployment of advanced penetration aids and maneuvering reentry vehicles for offensive forces, as well as increases in force levels, giving each side, in turn, an incentive to further improve the capabilities of its ABM systems.

The provisions of the ABM Treaty limit all strategic ABM defenses including those with the sole purpose of defending offensive missiles such as ICBMs. The US BMD R&D program, as currently constituted, will provide the technological base (as permitted by the Treaty) for an ABM system. Thus it provides a hedge against Soviet violation or abrogation of the ABM Treaty, without providing a direct impetus for the Soviets to increase their strategic offensive forces.

A future US BMD system, if deployed, could perform the unique function of defending against ballistic missile attack. Although not optimum for negating satellites in low earth orbit, a

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non-nuclear BMD system capable of high-altitude intercepts could have some of the capabilities needed to negate such satellites.

G. Verification.

[Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The FY 1983 US Ballistic Missile Defense program is consistent with the ABM Treaty and supports US arms control and national security policy. It is consistent with current and prospective arms control negotiations. The program is designed to: (1) avoid technological surprise, (2) provide deployment options as a hedge against Soviet violation or abrogation of the ABM Treaty, (3) improve the potential for US ICBM survivability, and (4) provide deployment options as a hedge to counter Soviet threat growth. It also supports our ability to assess the capabilities of US ICBMs and SLBMs to accomplish their strategic deterrent missions.

The BMD program currently has no adverse arms control impact.

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INTERMEDIATE-RANGE NUCLEAR MISSILE SYSTEMS AND THE SEA-LAUNCHED CRUISE MISSILE

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
64311A	PERSHING II (PII)
DOE Program	W85 PERSHING Warhead
Army Procurement	PERSHING
64362F	Ground-Launched Cruise Missile (GLCM)
Air Force Procurement	GLCM Missile
DOE Program	W84 GLCM Warhead
64367N	TOMAHAWK Missile System
Navy Procurement	TOMAHAWK Missile System

On December 12, 1979, Foreign and Defense Ministers from each of the participating members of NATO agreed on a program for the modernization of NATO Intermediate-Range Theater Forces (INF).

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The systems involved in this agreement are the PERSHING II (PII) and the Ground-Launched Cruise Missile (GLCM). In view of the close relationship these systems will share in the further development of the NATO INF Modernization Program, they are discussed together in this ACIS.

There have been no significant programmatic changes in either the PII or GLCM programs. A discussion of these programs is included this year because of the high level of interest in INF here and in Europe and the implications of INF modernization for US negotiating policy.*

The land-attack, sea-launched cruise missile is also discussed in this ACIS. As part of the President's overall package of strategic modernization initiatives, SLCM will be deployed on ships and submarines to expand and strengthen US world-wide sea-based forces. Although the roles and rationale for SLCM deployment are different from those of GLCM, the physical similarities of the two missiles raise a number of related arms control issues. Additionally, the initiation of a Vertical Launch System (VLS) program has the potential to change significantly the arms control implications attendant to SLCM deployment.

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* The term "Intermediate-Range Nuclear Forces" (INF) was introduced by the US as preparations were underway to begin negotiations with the Soviet Union in November 1981. Nuclear systems below intercontinental range but above the range of systems designed for use on, or in direct support of, the battlefield are in the INF category (e.g., GLCM, PII, SS-4, SS-5, and SS-20). The previous term, "Long-Range Theater Nuclear Forces" (LRTNF) was shifted to more clearly reflect the scope of negotiations and to dispel the idea that the US viewed Europe as a "theater" of nuclear conflict distinct from the US. NATO has not yet fully adopted the shift to the term INF.

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While the cruise missile systems discussed in this statement are capable of accommodating conventional warheads -- and indeed, in the case of SLCM, development of such applications is underway -- primary emphasis in this ACIS is on their nuclear capabilities and the contribution of PII and GLCM to NATO defense. INF will help to correct the current military imbalance in Europe, thereby strengthening NATO's deterrent capability. SLCM enhancements will contribute to the revitalization of the US strategic force posture by providing a secure strategic reserve force. INF also have implications for bilateral and multilateral arms reduction talks.

II. PROGRAM DESCRIPTIONS

A. PERSHING II.

1. Capabilities.

The PII, a land-mobile ballistic missile system, is a major improvement over the currently fielded PIa system. As currently envisioned, the PII will be armed only with nuclear warheads.

PERSHING Ia is currently deployed in Europe with both US Army units and units of the Air Force of the Federal Republic of Germany (FRG). [Deleted].

The PII system will employ a new missile and reentry vehicle (RV) as well as a modified version of the present erector/launcher and other ground support equipment. This upgraded ground support equipment would result in improved command and control and

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reduced response times and manpower requirements. The PII missile differs from its predecessor primarily by providing increased range and accuracy.

The PII has a maximum range of [deleted] compared to the current system's maximum range of approximately [deleted]. The range improvement, coupled with deployment [deleted].

The PIa RV utilizes the W50 [deleted]. PERSHING II is being designed to carry the W85 air burst/surface burst warhead. The W85 will have [deleted]. Higher accuracy allows the use of lower yields for a given mission with the PII, thereby reducing potential collateral damage.

Expected improvements to the PERSHING force resulting from the introduction of PII with its greater range, accuracy, [deleted] should help maintain current damage expectancies in the face of on-going Warsaw Pact/Soviet Union efforts to harden critical fixed theater targets. In particular, the Warsaw Pact has stressed emplacing earth covered concrete shelters ("hangarettes") on airbases, as well as concrete revetments to protect aircraft. Additionally, some command, control, and communications and nuclear storage sites in Eastern Europe have been hardened.

PII's pre-launch survivability, like that of the present

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PIa, stems from its mobility. While deployed at peacetime QRA sites and kasernes, [deleted].

PII's in-flight survivability, like that of PIa, stems from the high speed of the reentry vehicle. Development and deployment of an anti-tactical ballistic missile (ATBM) system would be required to reduce PII's effectiveness once launched. It should be noted that [deleted].

2. Program Status.

The PII program, initiated in FY 1975, is in the engineering development phase. A production decision is scheduled for FY 1982. The program is structured to provide an initial operational capability (IOC) in Europe in December 1983. The projected deployment completion date is December 1985. Conversion of existing US PIa launchers and replacement of existing US PIa missiles and warheads is planned on a one-for-one basis.

Long lead DOD procurement for the production phase will commence early in FY 1982. During FY 1983, the engineering development (ED) phase will culminate with the completion of the DT/OT missile flights and the second production buy will occur.

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B. Ground-Launched Cruise Missile (GLCM).

1. Capabilities.

The Ground-Launched Cruise Missile will be a variant of the TOMAHAWK cruise missile adapted for launch from air-transportable, ground-mobile platforms. The GLCM is 219 inches long and is powered by a turbofan engine. Guidance is by inertial navigation with terrain contour matching (TERCOM) updates at periodic intervals. It flies at subsonic speeds at low altitude. Its odometer range would be [deleted] to fuel exhaustion with relatively high terminal accuracy. The missiles will be transported four to a transporter-erector-launcher (TEL) and controlled from a launch control center (LCC). Four TELs, with sixteen missiles, and two LCCs constitute a fire control unit. The design of the launch control van, TEL, and associated electronics constitute the bulk of the program. System integration and testing make up the balance of the effort.

GLCM deployment in the European theater will begin in 1983. Its expected accuracy, ability to penetrate air defenses, pre-launch survivability, [deleted] will permit GLCM to destroy hard targets as well as attack soft targets effectively with relatively limited collateral damage. Consequently, the GLCM offers the prospect of helping to maintain current damage expectancies in the face of Warsaw Pact initiatives to make their fixed theater targets, such as hardened aircraft shelters, less vulnerable. GLCM's relatively long time-of-flight, however,

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would reduce its utility against long-range time-urgent targets.

The warhead planned for use with the GLCM is the W84. [Deleted].

The pre-launch survivability for the GLCM, like the PERSHING II, derives from the system's mobility. While deployed at permanent sites, the GLCM would be [deleted]. The GLCM should be [deleted]. GLCM's relationship to command and control systems would be analogous to those which exist for PERSHING missiles and tactical aircraft.

2. Program Status.

The GLCM is currently in full scale engineering development. Full system testing will begin in [deleted] using preproduction prototype missiles, TELs, and launch control centers. Development of the Integrated Logistics Support System continues along with development of the training program. DSARC

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III is scheduled for [deleted]. The IOC for GLCM is [deleted]. Current plans are to procure 560 GLCMs -- 464 nuclear-armed GLCMs for unit equipment, and 96 GLCMs for tests, training, and replacements.

During FY 1978, DOD requested DOE to initiate Phase 3 Development Engineering for the W84 warhead. The required IOC is [deleted].

C. Land-Attack Sea-Launched Cruise Missile (SLCM).

1. Capabilities.

The TOMAHAWK sea-launched land-attack cruise missile (TLAM), also a derivative of the TOMAHAWK Cruise Missile, is being developed with a conventional capability for both land- and ship-attack and a nuclear capability for land-attack. While PII and GLCM are oriented toward NATO requirements, the TLAM is being developed to satisfy US requirements worldwide. The TOMAHAWK missile is sized to fit the standard 21 inch torpedo tube and is capable of being deployed aboard a variety of surface ships and submarines. Its system characteristics are essentially identical to those of the GLCM as discussed above.

Deployed aboard submerged attack submarines, the SLCM would be virtually undetectable prior to launch. Moreover, once launched, [deleted]

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[deleted]. The land-attack SLCM will also be deployed, along with anti-ship SLCMs, on 637 and 688 class SSNs. Up to eight SLCMs could be deployed per SSN, with a mix of variants determined by the fleet commander based on the mission assignment. A Vertical Launch System (VLS) has been initiated which could provide submarines of the SSN 688 class with the capability to store and launch up to 12 TOMAHAWK Cruise Missiles (either land-attack or anti-ship) from vertical launch tubes without degrading the SSN's primary mission.

Deployed aboard attack submarines, command and control of nuclear land-attack SLCMs would be analogous to that exercised for the POSEIDON SLBMs.

SLCMs will also be deployed on surface ships, including cruisers and SPRUANCE class destroyers, each of which could normally carry a mix of [deleted] anti-ship and land-attack missiles. The Navy has funded a battleship refit program which would enable these ships to accommodate [deleted]. When deployed aboard surface ships, command and control of nuclear SLCMs would be similar to that exercised for [deleted].

2. Program Status.

The program to develop and test a sea-launched cruise missile was initiated in 1972. Operational testing and evaluation of the submarine-launched conventional land-attack version began in October 1981 and is scheduled to be completed in November 1982. The ship-launched version is scheduled to undergo similar testing

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during the the period April through September 1983. Procurement of conventionally-armed land-attack and anti-ship missiles began in FY 1980. The IOC currently established for the submarine-launched conventional land-attack SLCM is early CY 1982. The IOC for surface ship conventional land-attack and anti-ship missiles is programmed for FY 1983. The IOC for the TLAM/N is scheduled for [deleted].

III. STATED MILITARY REQUIREMENTS

The Warsaw Pact has deployed a variety of theater nuclear forces. These include the SS-20 long-range TNF ballistic missile, the medium-range SCALEBOARD and SCUD, as well as the [deleted]. In addition, the SCALEBOARD is now being replaced by the SS-22. They also have deployed large numbers of tactical aircraft in Eastern Europe and the Soviet Union with nuclear delivery capabilities. Additionally, the Soviet Union has deployed sea-based ballistic and tactical cruise missiles and, in Soviet territory, the SS-4 medium-range ballistic missile (MRBM) and SS-5 intermediate-range ballistic missiles (IRBM) as well as manned bombers. They [deleted]. In particular, the deployment of the SS-20 IRBM and BACKFIRE bomber has raised concerns within NATO about the adequacy of the Alliance's intermediate-range nuclear forces.

A. <u>NATO INF Modernization</u>.

Improvements to NATO theater nuclear forces would provide

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more survivable, credible, and effective military options linking NATO's conventional and shorter-range theater nuclear systems to the US strategic force. Deployments of longer-range INF missiles could lessen any Soviet doubts about the US strategic guarantee to NATO and help to alleviate concerns on the part of the Allies regarding Soviet force modernization by closing real or perceived gaps in the escalatory ladder. INF deployments by NATO are planned to be of a size and character so as to preclude perceptions of decoupling, while at the same time serving to deter a Warsaw Pact attack on Western Europe. Should deterrence fail, the US and its NATO Allies would possess effective new capabilities to engage military targets located well behind the forward edge of the battle area.

Current US theater nuclear systems capable of engaging significant fixed "rear-area" theater targets are:

- the PERSHING Ia ballistic missile
- dual-capable aircraft
- POSEIDON reentry vehicles committed to NATO

Additionally, the United Kingdom possesses POLARIS missiles and VULCAN aircraft capable of engaging these targets. (The VULCAN is being phased out beginning in 1981.)

Deployments of PII and GLCM to supplement or replace existing NATO theater nuclear systems promise to enhance current capabilities in six broad respects. First, they could provide NATO a modernized capability to strike targets on Soviet territory from Western Europe and thus strengthen the NATO deterrent against

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attack of Western Europe from Soviet territory as discussed above. Second, each of the proposed programs would offer increased accuracy and allow targeting of previously untargeted hard targets. Third, given their accuracy both would permit the use of lower yield nuclear weapons to attain the desired military effects thus permitting some reduction of collateral damage. Fourth, augmenting dual-capable aircraft with PII and GLCM potentially offers greater prelaunch system survivability under conditions of either conventional or nuclear attack. Fifth, cruise missiles may be more survivable than manned airborne platforms in the dense air defense environment that would characterize warfare in Europe. Sixth, by having available more capable nuclear missile systems of longer range on alert to cover preplanned fixed targets, some quick reaction alert aircraft could be available for other nuclear or conventional roles.

Central to the deterrence of conflict, and to defense should deterrence fail, is the preservation of a range of options in the event of aggression. The availability of a graduated escalatory ladder enhances deterrence by raising the possibility that aggression at any one level of conflict might either be matched in kind or escalated. Deployments of PII and GLCM add a new dimension to the variety of response options below the strategic level. This helps to insure the linkage between lower response options and the strategic nuclear forces and in so doing makes an effective NATO response more credible.

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B. Land-Attack SLCM.*

The land-attack SLCM is being developed with a view toward unique US requirements worldwide which are distinct from the NATO requirements for PII and GLCM. A land-attack SLCM would provide a survivable, credible, and effective military option on a worldwide basis. These accurate weapons would use warheads designed to destroy the target while at the same time minimize collateral damage.

Manned aircraft are the primary delivery vehicle of conventional ordnance to strike targets on interdiction and deep strike missions. The technology advancement offered by the land-attack TOMAHAWK program would enable the accurate delivery of conventional ordnance to long-range targets thus complementing manned aircraft.

The Navy has a variety of potential conventional land-attack roles in the conduct of its missions of sea control and power projection. In the sea control context, these roles include [deleted]. The Navy's current land-attack force consists of carrier-based A6 and A7 aircraft armed with iron bombs and precision guided munitions (PGMs). TLAM/C would both supplement and complement these carrier aircraft.

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* Also called the TOMAHAWK land-attack missile (TLAM).

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As complements to carrier air, TLAM/Cs could degrade enemy air defenses thereby clearing attack corridors for the sea-based aircraft.

The Navy's [deleted].

Deployment of [deleted].

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IV. FUNDING ("then year" $ in millions)

		FY 81 & Prior	FY 82	FY 83	FY 84 (est.)	FY 85 to Completion	Total Dev.	Total Prod.	Total Const.	Total Units	Unit Cost	Total Program Cost
												]
PERSHING II Missile System					[							
PE 64311A	Development	$ 388.1	150.6	113.3								
	Production	$ 2.3	221.6	508.6								
PERSHING II Warhead												
W85	DOE Development	$ [deleted]	[deleted]	[deleted]								
	Production	$ [deleted]	[deleted]	[deleted]								
PERSHING Ia Missile System												
	Production	$ 746.5	-	-				Deleted				
Ground-Launched Cruise Missile System												
PE 64362F	Development	$ 179.1	80.1	28.6								
	Production	$ 192.5	350.5	530.7								
	Construction	$ 23.1	75.0	85.4								
GLCM Warhead												
W84	DOE Development	$ [deleted]	[deleted]	[deleted]								
	DOE Production	$ [deleted]	[deleted]	[deleted]								
TOMAHAWK Missile System												
PE 64367N	Development	$ 892.4	120.0	72.3								
	Production	$ 205.6	236.3	308.4								
	Construction	$ 0	0.5	-	[							

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The missile and related warhead programs covered by this ACIS are consistent with US arms control policy. In the absence of international agreements to reduce nuclear stockpiles, there is a need to retain and modernize theater nuclear capabilities, especially those such as PII and GLCM which support NATO's strategy of flexible response.

The NATO decision to modernize its longer-range INF missile force was taken in response to the rapid and steady build-up of SS-20 missiles and BACKFIRE bombers. Both systems represent significant qualitative improvements over older Soviet systems, and were deployed during a period of declining NATO INF capability. For example, since 1977 the Soviets have already deployed some 250 SS-20 launchers (about 175 of these are deployed opposite NATO Europe) and their deployment is continuing. These deployments are in addition to 350 SS-4 and SS-5 launchers still fielded, all of which are also deployed against Europe. Further, the SS-20 design is tremendously advanced over the fielded SS-4s and SS-5s: its range is somewhat greater than that of the SS-5 and more than twice that of the SS-4; it is significantly more accurate than both the SS-4 and SS-5; and instead of a single one megaton warhead, it has three MIRVed warheads, [deleted]. The SS-20 is also more mobile and, therefore, more

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survivable than its predecessors. Additionally, the Soviets are developing long-range cruise missiles.

The NATO INF modernization program as reflected in the Integrated Decision Document [deleted] but seeks to ensure that NATO forces present a credible deterrent which preserves undiminished the security of the Alliance. The Integrated Decision Document which sets forth NATO's 1979 decision states that:

[Deleted].

In addition, as an integral part of their TNF modernization decision, Ministers further agreed, based on Alliance consideration, on a withdrawal of 1,000 US nuclear warheads from Europe as a step in the rationalization of the Alliance's nuclear force posture. The withdrawal was completed in 1980. This NATO position should [deleted]. However, much of the [deleted] will depend not only upon the pace and scope of US programs, and how these programs [deleted]

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[deleted].

The US is committed to both tracks of NATO's 1979 decision, namely force modernization and negotiation. After a period of intensive consultation with its Allies, the US began INF negotiations with the Soviets on November 30, 1981 in Geneva Switzerland. The US will continue consultations with its Allies during the course of these negotiations.

B. Relation to Arms Control Agreements.

1. Non-Proliferation Treaty.

Article VI of the Non-Proliferation Treaty to which the US, USSR, and 114 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to foreswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). As indicated above, INF arms control negotiations between the United States and the Soviet Union began on 30 November 1981.

Despite these efforts, many of the non-aligned nations

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at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

It is possible that US (or Soviet) programs could be cited by some governments as convenient rationalizations for building their own nuclear weapons. It must be noted, however, that many important non-nuclear-weapon countries are US allies that rely on the US nuclear arms umbrella and look upon US nuclear modernization as essential. Insofar as these countries are concerned, US nuclear modernization could inhibit proliferation.

In any case, unilateral US restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

2. <u>SALT II Agreement</u>.

The SALT II Treaty, which was to have run through 1985, was signed in June 1979, but has not been ratified. A comprehensive interagency review of US strategic arms control policy is

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currently under way. While it is the position of this administration that the SALT II Agreement will not be ratified in its present form, the US has indicated that, pending completion of this review, it will take no action that would undermine the SALT II Agreement as long as the Soviets exercise the same restraint.

The PII is not constrained by any arms control agreement to which the United States currently is a party. The SALT II Protocol, which was to have expired on December 31, 1981, would have prohibited the deployment of cruise missiles capable of ranges in excess of 600 kilometers on ground-based and sea-based launchers during the period of the Protocol. However, the development and testing of long-range (over 600 km) cruise missiles from sea-based or ground-based launchers was permitted as long as they were not equipped with multiple independently targetable warheads. Thus, GLCM and SLCM were not impeded by the Protocol, since they will not have multiple independently targetable warheads and the length of necessary developmental steps would have precluded their deployment prior to the expiration of the Protocol. The Protocol limitations would have expired with the Protocol and set no precedent for future negotiations.

3. LTBT/TTBT.

Development and deployment of warheads for longer-range INF missiles and SLCM missiles would not be affected by the Limited Test Ban Treaty which prohibits weapons tests in the atmosphere, in outer space, and under water.

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The terms of the Threshold Test Ban Treaty (signed but not ratified) limit the United States and the Soviet Union to nuclear tests of no more than 150 kilotons of explosive yield. [Deleted].

C. Effect on Current and Prospective Negotiations.

Deployments of land-based LRTNF longer-range INF missiles and SLCM must be assessed in light of current arms control negotiations. Additionally, these weapon systems have implications for negotiations concerning theater nuclear systems.

1. MBFR Negotiations.

[Deleted].

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2. CTB Negotiations.

The US has been engaged in Comprehensive Test Ban Treaty (CTBT) negotiations with the UK and the USSR. These negotiations were recessed in November 1980 without setting a resumption date. All nuclear test limitations are currently under US Government review. Any limitations agreed to subsequent to the [deleted].

Planned development testing of the [deleted] and the nuclear development testing of the [deleted]. However, [deleted].

3. Negotiations on Intermediate-Range Nuclear Forces.

Soviet deployments of new and modernized long-range theater nuclear systems -- in addition to their direct military significance -- have affected the NATO Alliance's perceptions with respect to the adequacy of NATO's present theater nuclear posture. As a result, following detailed analysis and consultation in the Alliance, NATO Foreign and Defense Ministers agreed in December 1979 on a program for the modernization of NATO LRTNF involving the deployment of 108 PERSHING II launchers and 464 GLCMs. At

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the same time, NATO agreed to pursue a parallel and complementary arms control approach for negotiations involving TNF within the SALT framework. This arms control approach would seek equal and lower levels of INF on both sides.

In December 1979, NATO Foreign and Defense Ministers, noting the special importance of negotiations involving INF for the overall security of the Alliance, also agreed to the constitution of a high level special consultative body within the Alliance to support US negotiating efforts. This body, the Special Consultative Group (SCG), was established on January 24, 1980, and has met frequently since.

In developing and pursuing a policy on arms control involving TNF in parallel with the preparation and implementation of the Alliance decision on the modernization of INF, [deleted]

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[deleted].

The first proposal to discuss INF was made shortly after the December 1979 TNF decision when the [deleted]. In May 1981 the Allies reaffirmed their December 1979 resolution to pursue TNF arms control negotiations while moving ahead with NATO modernization.

After extensive consultation with its NATO allies, the US began INF negotiations with the USSR on 30 November 1981. The US delegation presented and elaborated on the proposal announced by the President on 18 November 1981. Under this proposal the Soviet Union would remove and dismantle the SS-20 and retire the SS-4 and SS-5 systems in return for US cancellation of plans to deploy PERSHING II and GLCM. The President also indicated a willingness to seek subsequent limits with significant reductions for other nuclear weapons systems and pledged that the US will negotiate in good faith to achieve global, equal and verifiable levels of weapons.

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The impact of TLAM/N on INF arms control is [deleted].

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[deleted].

[Deleted].

While the penetrativity of the cruise missile does not equal that of a ballistic missile, the wide variety and number of ships currently being considered as potential launch platforms create for the Soviet Union a potent nuclear threat which is both highly mobile and, in total, difficult to detect. Further, when the US [deleted] and if future negotiations lead to limits on central systems and on land-based TNF missiles, the Soviets may not agree to exclude SLCMs permanently from limitations -- unless they wish to exclude their own SLCMs (or BACKFIRE) from limitation.

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D. Effect on Global and Regional Stability.

The contribution of longer-range INF missile modernization to stability at the global or regional level seems to depend upon five sets of interrelated factors: (1) the Soviet/Warsaw Pact buildup of conventional and nuclear forces; (2) the characteristics of the new longer-range INF missile systems themselves; (3) the pace and scope of INF deployment; (4) Soviet perceptions of US longer-range INF missiles and Soviet technological responses to their deployment; and (5) the perceptions of our allies of US longer-range INF missile modernization. Each set of factors is discussed in turn below but throughout the discussion it is important to remember that the factors are interrelated. The relative importance one assigns to one particular set, vis-a-vis the others, will affect overall judgments about whether TNF modernization is stabilizing or destabilizing.

1. Soviet Threat.

The Warsaw Pact has over the years developed a large and growing capability in nuclear and conventional systems that directly threaten Western Europe and have a strategic significance for the Alliance in Europe. This situation has been especially aggravated over the last few years by Soviet decisions to implement programs modernizing and expanding substantially their long-range nuclear forces. In particular, they have deployed the SS-20 missile, which offers significant improvements over previous systems in providing greater accuracy, more mobility, and greater range, as well as having multiple warheads, and the BACKFIRE bomber, which

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has a much better performance than other Soviet aircraft deployed hitherto in the peripheral role. During this period, while the Soviet Union has been reinforcing its superiority in INF both quantitatively and qualitatively, Western INF capabilities have remained static. At the same time, the Soviets have also undertaken a modernization and expansion of their shorter-range TNF and greatly improved the overall quality of their conventional forces.

2. System Characteristics and Deployments.

Official NATO and US strategy is flexible response, the ability to respond appropriately to any level of aggression, and to escalate as necessary to deter or defeat aggression against NATO. The longer-range missile modernization program recently approved by NATO will improve the credibility of NATO TNF in the face of Warsaw Pact theater nuclear force modernization and, consequently, can be viewed as strengthening regional and global stability. Moreover, since it is US and NATO policy that modernization of theater systems should not take precedence over modernization of conventional forces, there will be no increased dependence on nuclear weapons resulting from such deployments.

[Deleted]

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[deleted]. Consequently, the credibility of NATO nuclear options would be strengthened. [Deleted].
These systems like other US/NATO systems would be designed to operate according to clearly established command and control procedures [deleted].

Additional factors affecting stability and deterrence with the introduction of the PII, GLCM and SLCM systems are their ranges, flight times, the numbers deployed, and survivability:

- The cruise missile's range is a significant factor from a military standpoint and could be from an arms control point of view as well. [Deleted]. (Of course, flown to lesser ranges from the various possible base areas, cruise missiles could strike targets [deleted]).

- The relatively slow flight of current generation cruise missiles should not represent an increased first-strike threat to the Soviet Union. Rather, cruise missile deployments symbolize a second-strike capability which should have a stabilizing effect.

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- Cruise missiles are difficult to detect and have the ability to change direction. This could result in Warsaw Pact misassessment of the attack origin, size, and intended targets, possibly provoking a disproportionate Soviet response.

- [Deleted].

Stability and deterrence will be affected by other factors as well. PERSHING, for example, [deleted].

3. Soviet Responses.

While modernized US TNF contribute to stability in meny respects, assessment of their net effect on stability also must incorporate potential Soviet reactions during peacetime.

The USSR might react to the prospective increase in NATO's longer-range INF missile capabilities with additional weapon programs and further diplomatic activity of its own in Western Europe or the Soviets could become more willing to engage in substantive arms control negotiations. For example, they have long been aware of Western concerns about the continuing Soviet buildup of modern INF. It was not until the prospect of Western deployments became real, however, that the USSR displayed any sign of willingness to negotiate limitations on its own theater nuclear systems.

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4. Allies' Perceptions and Reactions.

Allied confidence in NATO's deterrence posture derives not merely from the capabilities of US forces, but also from the clearly perceived cohesion of the Atlantic Alliance. This cohesion is dependent upon our Allies' perceptions that there is a linkage of theater forces -- conventional, shorter-range nuclear forces, and INF -- to US strategic forces. Thus, on the one hand, while there is an acknowledged requirement for improved INF to counter recent Soviet gains, there is also some resistance among the Allies to increasing NATO's Europe-based long-range nuclear capability in the fear that a Euro-strategic balance may be created which would decouple NATO nuclear forces from US strategic forces.

At the same time, [deleted].

NATO's decision to modernize its longer-range INF missiles is directed toward lessening perceptions of gaps in the continuum of NATO capabilities and to enhance deterrence, Alliance cohesion, and stability.

E. Technological Implications.

The major technological impact of current INF modernization programs is likely to be their effect on the weapons acquisition policies of other countries.

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While the increased capabilities of advanced cruise missiles might make their production militarily and politically attractive to some nations, because of the high technology required and high development costs it seems unlikely that, except in a few cases, such programs are likely to be undertaken. [Deleted]. The current non-US systems could undoubtedly be upgreded, but the limited research, development, and production bases of many nations, coupled with the high cost of developing advanced cruise missiles, make them an unattractive acquisition option for all but a select few. Manned aircraft continue to present more readily available and sufficiently flexible delivery systems to meet the present needs of most states.

Similarly, most smaller countries would not seek a conventionally-armed cruise missile whose payload and high accuracy would be militarily significant only when combined with sufficient tactical air power. Large numbers of cruise missiles would be required for the same task as limited numbers of aircraft. Manned aircraft, which also possess some stand-off capability, could deliver greater payloads and more varied munitions.

[Deleted]

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[deleted].

Other countries may intend cruise missiles for less demanding missions than the US. In such cases, development of relatively unsophisticated cruise missiles could be seen as being practical. Development of cruise missiles similar to ours, however, could present formidable technical obstacles to other states. In any case, the impact of the US decision to deploy cruise missiles on the incentives of our allies to assume a similar course is uncertain.

[Deleted].

[Deleted]

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[deleted].

It should be noted that, although the US air-launched cruise missile provides a major incentive for the USSR to pursue option "a" above, the USSR already has considerable incentives in this regard, and is clearly moving in this direction.

[Deleted].

F. <u>Potential Interaction with Other Programs</u>.

As discussed previously, INF are important to deterrence because they constitute a link between conventional capabilities and US strategic forces. [Deleted]

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[deleted]. The range of options resulting from conventional, theater nuclear, and strategic forces provides some possibility of controlling escalation and stopping conflict at the lowest level possible should deterrence fail. Additionally, the increased operational control, survivability, and flexibility of these nuclear forces strengthen stability.

Moreover, the increased survivability of PII, GLCM and SLCM might allow the West to put relatively less dependence on aircraft for the delivery of nuclear weapons, thereby releasing some aircraft for conventional roles. This increased conventional capability could aid in raising the nuclear threshold, and at the same time, improve survivability and stability.

Underlying this discussion is the overall requirement for longer-range INF modernization to improve NATO's deterrent posture and allay concern over inadequacies in NATO's long-range theater nuclear strike capabilities, while taking account of the requirement for the continued credibility of US-based and sea-based nuclear systems and possible Soviet responses to NATO action. New deployments of long-range theater nuclear systems will strike a balance, so as to reassure Allies and enhance deterrence by providing more effective INF, but not so as to undermine the credibility of the US strategic commitment to NATO, nor unnecessarily provoke Soviet responses detrimental to Western security.

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G. Verification.

Any arms limitation treaty agreed upon by the US must provide verification measures on which the US can rely without hesitation.

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[Deleted]

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[deleted].

[Deleted].

[Deleted]

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* The fuel exhaustion range of cruise missiles is the range definition used in the SALT II Agreement.

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[deleted].

[Deleted].

[Deleted].

[Deleted]

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[deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The PERSHING II, GLCM, and SLCM programs are consistent with US arms control policy and related Presidential decisions and are not constrained by existing arms control agreements.

The effect of US modernization programs on current and prospective arms control negotiations has already been demonstrated in the INF talks. In the face of Allied resolve to go forward with INF deployments, the Soviets dropped their preconditions for entering into negotiations with the US. US modernization programs could engender further modernization of Soviet TNF. On balance, however, there would be little prospect for concrete arms control results involving INF in the absence of NATO's decision to modernize these forces.

The effect of [deleted].

The impact of PII and cruise missiles on global and regional stability is a function of [deleted]

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[deleted].

The technological implications of these programs [deleted]. PII and GLCM have synergistic effects with each other, battlefield tactical nuclear systems, and other nuclear weapons used in long-range theater roles. TNF interact with both conventional and US strategic forces in the doctrine of flexible response, providing for enhanced deterrence and the possibility of escalation control should deterrence fail. They also allow overall improvements to the survivability and stability of NATO's theater nuclear posture. The Alliance's decision on new longer-range INF missile systems strikes a balance so as to enhance deterrence by providing NATO with more effective TNF, while not undermining the credibility of the US strategic commitment to NATO, nor unnecessarily provoking Soviet responses detrimental to Western security.

NATO's decision to modernize its longer-range INF missiles provides for the deployment of PERSHING II and GLCM, but without increasing the current nuclear weapons stockpile in Europe. The

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modernization decision includes a parallel NATO decision on an arms control approach to the Soviet Union involving INF.

With respect to potential future arms control agreements, mobile systems such as the SS-20 and GLCM are likely to present difficulties for verification. In summary, the US PERSHING II, GLCM and SLCM programs are important to deterrence and stability. Like any nuclear modernization program, however, they entail political costs and carry with them important arms control implications. In this regard, we will continue to ensure that these programs are consistent with our overall national security objectives, including the development of future options for limiting strategic and theater nuclear arms to ensure deterrence and global stability.

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SHORT-RANGE NUCLEAR FORCES

SHORT-RANGE NUCLEAR FORCES

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
Procurement	W70-3 Warhead (LANCE) (DOE)
Procurement	W79 Warhead (8-inch) (DOE)
Procurement	8-inch Nuclear Projectile (DOD)
Development & Procurement	W82 Warhead (155mm) (DOE)
64603A (D385) & Procurement	Improved 155mm Nuclear Projectile (DOD)
63320A (D302)	Corps Support Weapon System (DOD)

Short-range Nuclear Forces -- dual-capable artillery and short-range missiles -- comprise the low end of the spectrum of US nuclear weapons. These weapons are an important component of NATO's military forces and deterrent posture. They are intended for use on the battlefield in direct defense or deliberate escalation against front line Warsaw Pact forces should the Pact engage in a nuclear conflict, or should NATO forces be unable to maintain a conventional-only defense against a Pact attack. These weapons

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support NATO's doctrine of flexible response which suggests the possibility that a conflict in Europe could be escalated in a controlled way to seek its termination. At the same time, because dual-capable short-range nuclear systems are likely to be involved in war at an early stage, their deployment and modernization raise several concerns. These concerns, long in the background of debates concerning NATO's nuclear planning, have become more prominent as a result of the controversy surrounding the reduced blast/enhanced radiation (RB/ER) feature of certain new warheads being produced for US short-range nuclear systems.

These new warheads are designed to improve various performance characteristics [deleted], more secure and responsive command and control, command disable capability, and greater safety than existing warheads possess. The enhanced radiation design makes possible a reduction in the blast and thermal yields of these weapons compared to the yields of their predecessors thus reducing the potential for collateral damage* to civilians, friendly military forces and real property should these weapons be used. At the same time the weapons' lethal radius would be maintained or improved through an enhanced emission of radiation.

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* Collateral damage is broadly taken to mean any form of undesired damage including civilian casualties and damage to the civilian infrastructure produced by the effects of friendly nuclear weapons.

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On April 7, 1978, former President Carter announced that he had decided to defer production of weapons with enhanced radiation effects. At the same time, President Carter directed that modernization of the LANCE and 8-inch artillery-fired atomic projectiles (AFAPs) should proceed, with the ultimate decision concerning incorporation of the enhanced radiation feature to be made later. On October 18, 1978, President Carter announced his decision to proceed with the production of the LANCE and 8-inch AFAP warheads using designs which would permit their subsequent conversion to enhanced radiation warheads. In addition, to maintain the option of installing enhanced radiation elements later, some of the [deleted] enhanced radiation components were to be produced [deleted]. This was not a decision to produce enhanced radiation weapons. That decision was made by President Reagan on August 6, 1981, when he announced that enhanced radiation weapons would be produced and stockpiled on US territory. There are no plans to deploy enhanced radiation weapons (ERW) outside of US territory.

II. PROGRAM DESCRIPTIONS

Technical characteristics of existing and proposed warheads of US short-range nuclear systems are summarized below.

A. LANCE W70 Mod 3 Warhead.

1. Program Characteristics.

The LANCE is a mobile, surface-to-surface, ballistic missile system which can provide tactical nuclear (or conventional) artillery support on the battlefield under all-weather conditions

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and other visibility limitations (given effective target acquisition).

[Deleted].

All LANCE system Mods incorporate improved safety features and more secure command and control links than earlier nuclear weapon systems. [Deleted]. All W70 series warheads include a command disabling feature, which would permit them to be disabled non-violently [deleted], to prevent unauthorized use. [Deleted]. These warheads also incorporate Category D, Permissive Action Links with multiple code coded switches to prevent unauthorized arming of the warhead. This device requires insertion of a six-digit code to activate warhead functions. Multiple codes can also be used and managed to allow only selected weapons to be unlocked; this provides for selectivity and control in the release of warheads.

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The LANCE has replaced the HONEST JOHN and SERGEANT missile systems previously deployed with US forces in Europe; replacement of these systems in the forces of several NATO countries (UK, FRG, Belgium, Italy and the Netherlands)* is complete. [Deleted]. Additionally, two LANCE battalions (a total of 12 launchers) are based in the US. [Deleted].

Nuclear-armed LANCE missiles can be fired to a range of between [deleted]. LANCE range provides a capability to attack targets well bayond cannon artillery range. It also makes it possible for LANCE battalions to remain further behind the front line own troops (FLOT), contributing to greater survivability of the system. The system is designed to cover the corps front [deleted]

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* [Deleted].
** [Deleted].

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[deleted].

2. Program Status.

[Deleted].

[Deleted].

B. Corps Support Weapon System (PE 63320A).

1. Program Characteristics.

The Corps Support Weapon System (CSWS) is an Army program in the Concept Definition Phase to explore development of a corps-level replacement for the LANCE Missile System and to provide improved range, accuracy, survivability and responsiveness. The Mission Element Need Statement (MENS) for the CSWS which was approved in April 1981, is as follows:

> There is a need to attack targets at ranges beyond the capability of cannons and rockets with conventional, nuclear, and chemical weapons in order to destroy, neutralize, disrupt, or delay enemy forces (mobile, stationary, fixed). By slowing down the enemy's ability to reinforce and support the central battle, friendly forces can overcome the expected unfavorable force ratio.

It is the nuclear role that makes the CSWS eligible for inclusion in this ACIS.

A Special Task Force (STF) was established in March 1981, at the US Army Field Artillery Center, Fort Sill, Oklahoma, to manage the CSWS program during the Concept Definition Phase.

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2. Program Status.

The STF will evaluate viable alternatives (e.g., Multiple Launch Rocket System derivatives, LANCE missile variants, PATRIOT missile variants, ground-launched cruise missile, wheeled versus tracked loader-launchers, etc.) to insure the system selected best meets the needs described in the MENS. The FY 1983 planned program calls for continuation of the Concept Definition Phase in FY 1983 and FY 1984. Validation and start of the Demonstration Phase are scheduled in FY 1985.

C. 8-inch Artillery-Fired Atomic Projectile (AFAP) (W79 Warhead/M-753 Projectile).

1. Program Characteristics.

The 8-inch howitzers are dual-capable artillery, able to deliver either conventional or nuclear projectiles. The M-753 AFAP is intended to replace the current nuclear 8-inch projectiles deployed with US and NATO artillery units although no decision has been made as to deployment of the W79. The M-753 would incorporate the W79 warhead.

The W79 warhead [deleted]. The W79 is designed to provide improved safety and security in arming, storage, and handling similar to the W70. [Deleted]

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[deleted].

The principal features of the new 8-inch AFAP which would contribute to its greater effectiveness are increased delivery range, more accurate fuzing, and reduced response time. The present 8-inch round initially entered the US inventory in 1956; [deleted]. The present round makes [deleted].

The relatively short [deleted] range of the existing projectiles makes the 8-inch firing unit potentially more vulnerable to suppressive fire and conventional attack. The new projectile would increase the range to [deleted], not only increasing targeting flexibility and counterbattery capability, but also survivability. The new 8-inch AFAP would allow positioning of batteries further from the FLOT while at the same time improving area coverage of enemy targets by at least 40 percent.

[Deleted]

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[deleted].

2. Program Status.

[Deleted]. Initial operational capability (IOC) for the W79 [deleted].

Full-scale production of the W79 was initiated [deleted].

D. 155mm Artillery-Fired Atomic Projectile (AFAP) (W82 Warhead/XM-785 Projectile).

1. Program Characteristics.

The 155mm howitzers are dual-capable artillery, able to deliver either conventional or nuclear projectiles. The XM-785 AFAP is intended to replace the current 155mm nuclear projectile deployed with US and NATO artillery units. The XM-785 AFAP will incorporate the W82 warhead.

NATO members generally have about four times as many 155mm artillery tubes as 8-inch artillery tubes (for example, the Central Region currently has approximately [deleted] tubes of 155mm artillery and approximately [deleted] tubes of 8-inch artillery). Most 8-inch units are currently certified for nuclear rounds, as are about [deleted] percent of the 155mm howitzer units; this percentage is expected to rise somewhat with the fielding of the new 155mm AFAP

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and a new family of NATO 155mm howitzers. These larger numbers of 155mm nuclear capable artillery pieces would help assure the survival of a substantial short-range nuclear capability in the event of a Warsaw Pact conventional attack or nuclear strike. A broadly based 155mm nuclear capability prevents the Pact from focusing its attack on the less numerous 8-inch artillery. [Deleted].

In September 1977, DOD formally requested DOE to initiate development engineering (DOE Phase 3) of the W82. The Phase 3 request stated that the new warheads should be [deleted].

The [deleted] warhead yield is expected to be [deleted], there would be an increase in yield and effectiveness as compared to the current W48 warhead, which has a [deleted].

The designers of the W82/XM-785 have taken advantage of

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technology developed in the 8-inch AFAP program to [deleted] include radar fuzing, rocket-assisted propulsion, and ballistic similitude with conventional ammunition.

As in the LANCE and the new 8-inch AFAP, command and control of the new warhead would be improved by use of a Category D PAL system. [Deleted]. Modernization of safety features are also included in the new projectile.

2. Program Status.

Development engineering (DOE Phase 3) began during FY 1978. As a result of a DOD budget review, the priority of the 155mm AFAP development was lowered resulting in the IOC being delayed. [Deleted]. The production completion date [deleted].

[Deleted].

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In FY 1982, funds were requested to procure production-line quality fuzes, projectile-aft body/rocket motors, containers and fuze setters to support Development Testing/Operational Testing II in [deleted].

III. STATED MILITARY REQUIREMENTS

AFAPs and LANCE missiles are each designed to fill specific operational roles. Together, they provide unique capabilities not duplicated by other nuclear forces and provide NATO with a greater range of military options. As such, they contribute to the world-wide deterrence of nuclear and conventional aggression, and specifically enhance NATO's ability to wage nuclear war should it occur.

LANCE provides a capability for shallow interdiction of first and second echelon forces located beyond the range of nuclear cannon artillery. It thus complements the shorter range AFAPs. Its longer range and larger yield are best suited for strikes against semi-fixed and fixed targets, large concentrations of enemy forces massing for follow-on attacks, and materiel-type targets.

If the Corps Support Weapon System (CSWS) replaces the present LANCE system, it would be expected to assume the nuclear missions currently assigned to LANCE. [Deleted]. However, this [deleted] range would still be insufficient to strike targets in the Soviet Union from countries where the LANCE is deployed.

Even though the initial statement of requirement for improved short-range nuclear systems was made in the 1960s, the

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most recent expression of this was in the response to former President Carter's request for review of the requirement for tactical nuclear weapons. The review which was completed in late FY 1977 stated that:

> For these ground force tactical nuclear systems (tactical missiles and nuclear artillery) to retain their credibility as a contribution to the theater nuclear deterrent, long-standing deficiencies which were tolerable under earlier strategies must now be rectified, i.e., these systems must be modernized to face the current and future operational requirements and constraints of NATO's strategy of flexible response.

The review indicated that improved short-range nuclear systems are required, since current systems (8-inch and 155mm AFAP) are limited in range to approximately [deleted] km and have either too little military effectiveness (155mm) or a lower ratio of military effectiveness to collateral damage than may be acceptable (8-inch). Modernization requirements for LANCE and AFAPs include safety, security, flexibility, and more precise military application. Moreover, because of the possibility that artillery weapons, at least, might have to be used on or near NATO territory, [deleted] safety of our own troops have to be taken into consideration.

As compared to the SERGEANT and HONEST JOHN missiles it replaced, LANCE has improved accuracy, [deleted], and has greater range than the HONEST JOHN. It also makes possible quicker reaction times than the older systems. [Deleted]

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[deleted].

The W70-1,-2 warhead now deployed for LANCE, does not provide as great a degree of flexibility or effectiveness as the W70-3 LANCE warhead which is a production change from the W70-2 warhead. The W70-3 provides LANCE [deleted]. This modification provides greater flexibility to the LANCE system which is particularly important for ranges beyond that of the 8-inch W79/M-753 projectile.

Missiles are necessary, but are not the only weapons needed to fulfill the missions assigned to short-range nuclear systems. As compared to dual-capable artillery, the relatively small number of LANCE launchers (and the expense of increasing that number), its lower rate of fire, and the larger distance required for minimum troop safety, limit the potential use of LANCE against a variety of targets in the forward battle area. Moreover, as compared to cannon artillery, missile systems which are deployed in fewer numbers require greater dependence on concealment, deployment in-depth, frequent movement, and communications security for their survivability.

DOD requirements for increased range, greater accuracy, more responsive command/control, greater safety, and reduced collateral damage are all reflected in the design of the proposed new rounds.

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[Deleted], it should be noted that the new short-range nuclear systems have not been developed in response to these specific developments, but rather in concern over across-the-board improvements in Pact military capabilities.

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IV. FUNDING ("then year" $ in millions)*

	FY 81 & Prior	FY 82	FY 83	FY 84 (Est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
W70-3 Warhead (LANCE, DOE)	[									]
Development $										
Production $										
W79-1 Warhead (8-inch, DOE)										
Development $										
Production $										
8-inch Improved Nuclear Projectile (PE 64603A-Project D663)					Deleted					
Development $										
Production $										
W82 Warhead (155mm, DOE)										
Development $										
Production $										
Improved 155mm Nuclear Projectile (PE 64603A - Project D385)										
Development $										
Production $										
Corps Support Weapon System										
Development $										
Production $	[									

* Sources: DOD;DOE.
** FY 85-87, not to completion.

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The modernization programs for short-range nuclear systems described in Part II of this ACIS are consistent with US arms control policy. In the absence of satisfactory international agreements to reduce nuclear stockpiles, there is a need to retain and modernize US theater nuclear capabilities, especially those which support NATO's strategy of flexible response.

In discussing the relationship between arms control policy and the modernization of short-range nuclear weapons, the analysis which follows considers the overall effects of the projectile/warhead programs W70-3, W79, and W82; [deleted].

1. Overall effects.

In its strategy, NATO has confirmed the role of dual-capable short-range artillery which can fire nuclear projectiles; these weapons are specifically supportive of the NATO doctrine of flexible response. The effective implementation of NATO doctrine in a manner consistent with announced strategy contributes to stability in Europe -- an arms control objective. The modernization of these warheads is consistent with arms control goals. Improvements in range, accuracy, [deleted], control, and security features -- all of which characterize

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the new warheads -- represent evolutionary changes in existing weapons and are unlikely to affect significantly existing perceptions of these weapons or their relationship to US arms control efforts.

The fact that short-range nuclear systems must be deployed near the front lines to be effective has been a cause of some concern because, conceivably, this forward deployment could tempt the Warsaw Pact to attack these NATO systems with their own nuclear systems, thereby drawing NATO into a nuclear exchange with all the dangers of escalation that implies. However, a Soviet strike probably would be initiated upon indication that NATO intended to use nuclear weapons or if necessary to achieve Soviet objectives and would target known nuclear storage sites and deployments, not just LANCE or dual-capable artillery. The improved command, control, and security features of both the modernized AFAPs and the current and modernized LANCE also should reduce the possibility of an unauthorized nuclear use. In both these ways, the short-range nuclear weapon programs are supportive of US arms control objectives.

2. Effect of [deleted] 155mm AFAP.

In the case of the 155mm AFAP, the fact that the new AFAP [deleted] does not detract from this assessment of consistency with US arms control policy. The higher yield creates a potential for increased collateral damage; however, achieving ballistic similitude with

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the new AFAP and thus improving delivery accuracy could ameliorate the problem so it does not necessarily follow that increased collateral damage would result. More importantly, the increased effectiveness of the 155mm AFAP should strengthen deterrence.

3. Effects of incorporating enhanced radiation.

The prospect of enhanced radiation weapons has already been incorrectly perceived by many, here and abroad, as representing a change in US doctrine which would make use of nuclear weapons more likely in a tactical situation and as introducing a fundamentally new nuclear weapon. Responsible US officials have stated repeatedly that enhanced radiation weapons would remain under the same strict political control as any other nuclear weapon. It is the US position that enhanced radiation weapons do not lower the nuclear threshold and that they represent evolutionary rather than revolutionary modernization of short-range nuclear systems. In any case, weapon modernization is not precluded by any treaty.

Additionally, the existence of more effective nuclear weapons with lower collateral damage potential and fewer expected civilian casualties may be perceived by adversaries to increase the likelihood that these weapons would be used in combat. Thus, the Soviets could believe that NATO's nuclear threats are more credible and that NATO has placed greater reliance on nuclear weapons for warfighting. In this event, availability of enhanced radiation warheads would increase deterrence of war overall, but at

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the same time could increase Soviet propensities to initiate the use of nuclear weapons if they have decided to go to war. This is, of course, the dilemma of nuclear deterrence, which must contain some threat of use to be credible. It is, however, NATO policy not to place greater reliance on nuclear weapons for either deterrence or warfighting.

B. Relation to Arms Control Agreements.

Article VI of the Non-Proliferation Treaty (NPT), to which the US, USSR, and 114 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon state parties.

In keeping with Article VI, the US has participated in a number of arms control negotiations such as SALT and negotiations on a Comprehensive Test Ban Treaty (CTBT). The US and the Soviet Union began arms control negotiations involving intermediate-range nuclear forces in Geneva, Switzerland, on November 30, 1981.

Despite these efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was

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unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

The US is not party to any treaty or other legal obligation that would inhibit the development, production or deployment of short-range nuclear weapons.* Development of these weapons is not affected by the provisions of the yet to be ratified Threshold Test Ban Treaty.

The features intended to improve the security of, and help guard against accidental or unauthorized use of the W70-3, W79, and W82 warheads are supportive of the obligations incurred in the 1971 "Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics."

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* The provisions of Articles I and II of the Non-Proliferation Treaty, while not addressing deployment specifically, require that these nuclear weapons remain under US control.

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There is no customary rule of international law or international convention which would prohibit the use of nuclear explosive weapons.* It is the US understanding, placed on record at the time of signing, that the rules established by the recently concluded Additional Protocol I to the 1949 Geneva Conventions** were not intended to have any effect on, and do not regulate or prohibit the use of nuclear weapons. We intend to repeat this understanding at the time of ratification, and we anticipate that most of our allies will make statements to the same effect.

C. Effect on Current and Prospective Negotiations.

[Deleted].

The US has been engaged in Comprehensive Test Ban Treaty (CTBT) negotiations with the UK and the USSR. These negotiations were recessed in November 1980 without setting a resumption date. [Deleted]

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* Article IV of the Outer Space Treaty and Article I of the Seabed Arms Control Treaty do, however, prohibit the stationing of nuclear weapons or other weapons of mass destruction in outer space or on the seabed or ocean floor.

** Adopted on June 8, 1977, by the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts, also known as the Law of War Conference.

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[deleted].

Neither side has tabled proposals at the Mutual and Balanced Force Reduction talks in Vienna that would constrain the modernization of short-range nuclear weapons.

The short-range, nuclear-capable systems discussed in this ACIS [deleted].

At the May 1981 North Atlantic Council meeting of foreign ministers in Rome, the allies reaffirmed their December 1979 resolution to pursue TNF arms control negotiations while moving ahead with NATO TNF modernization. The NATO allies welcomed the stated intention of the United States to begin such negotiations with the Soviet Union by the end of CY 1981.

The Soviet Union has sought to gain propaganda advantages by proposing that the United States and the USSR mutually renounce the development and production of enhanced radiation weapons. Such an agreement [deleted]. More importantly, such an agreement would provide asymmetrical advantages to the Soviet Union. Although they also have offensive application, the principal value of enhanced radiation weapons lies in their potential use to defend against an

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armored offensive, a problem facing NATO but not the Warsaw Pact. In discussions with a group of US Senators, Brezhnev stated that the Soviets tested but never started production of a neutron bomb. [Deleted]. For reasons such as these, the United States has viewed the Soviet mutual renunciation proposal as propaganda.

D. Effect on Global and Regional Stability.

The US believes that nuclear forces play an important role in the defense of NATO. NATO's strategy of flexible response provides a variety of theater nuclear options in support of diplomatic and military efforts to bring the conflict to early termination on terms acceptable to the US and her allies.

[Deleted] were to materialize over the long-run, they could result in a marginal reduction in the nuclear threshold; that is, NATO may appear to be relying more on nuclear weapons than before.

On the other hand, failure to modernize NATO's short-range nuclear weapons could suggest to European countries that the US lacked the determination to use nuclear weapons, if necessary, to defend Western Europe. This also could weaken European incentives to strengthen conventional forces, or alternatively, cause

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them to strike out on their own if they came to believe that the ultimate deterrent was not credible. If taken along with improvements in US conventional capabilities, TNF modernization may be seen as demonstrating the US commitment and thus provide additional encouragement to the allies to strengthen their conventional capabilities. Such a response could raise the nuclear threshold. Even so, whether or not improvements in short-range nuclear weapons would have any discernible effect on the nuclear threshold is far from clear. The use of any nuclear weapon -- even low-yield, short-range weapons -- would constitute one of the most agonizing decisions that a political leader could face because of the risks implicit in the enemy's response and the grave dangers of escalation. The capabilities of conventional forces are likely to be far more significant determinants of the nuclear threshold than the relative effectiveness of short-range nuclear weapons. For this reason, NATO consistently has set conventional improvements as its highest priority.

E. Technological Implications.

Despite the fact that the new short-range nuclear weapons are more capable than weapons already deployed in Europe, their production is not likely to significantly affect East-West competition in military technologies. NATO has had small-yield artillery weapons in its stockpiles since the late 1950s; the Soviet Union possesses rockets (FROG series) with nuclear warheads and [deleted]

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[deleted].

The effect on technological competition with the USSR of the decision to produce RB/ER weapons is not yet known. Soviet leaders have stated that they would produce these weapons if the US did: [deleted].

President Valery Giscard d' Estaing, at his press conference on June 26, 1980, announced that France had developed and tested a prototype of a neutron warhead and would be ready in two or three years to decide whether to produce it. On September 14, 1981, Prime Minister Pierre Mauroy declared that the new Mitterand Government would continue research and development on neutron weapons in order to preserve the nuclear independence of France.

[Deleted]. An unclassified Chinese publication indicates that [deleted].

F. <u>Potential Interaction with Other Programs</u>.

Theater nuclear forces are important to deterrence as a link between conventional capabilities and US strategic forces. The short-range nuclear weapons represent one end of this spectrum of nuclear deterrence -- through the threat they pose to Warsaw Pact front-line troops.

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Modernized short-range weapons would add to the military effectiveness of theater nuclear forces. This overall effectiveness of TNF would be enhanced by incorporation of enhanced radiation features in certain short-range nuclear weapons. These RB/ER weapons are designed to increase the vulnerability of massed Warsaw Pact tank forces in the Western and Eastern European area.

The relationship among programs is reinforced by the increasing interdependence of arms control negotiations on strategic, intermediate-range nuclear forces (INF), and conventional weapon systems. In this regard, negotiations with the Soviets on intermediate-range nuclear forces have begun.

In accordance with standard DOE practice, the nuclear material which will be recovered upon retirement of the currently deployed 8-inch AFAP is planned to be reused in the production of new and replacement warheads for the nuclear weapons stockpile.

G. Verification.

At the present time, no arms control agreements apply to short-range nuclear warheads. [Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Modernization of NATO short-range nuclear weapons is consistent with US arms control policy. Improvements planned for these weapons will increase NATO's capability to deter a

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conventional or nuclear attack by the Warsaw Pact. Moreover, if deterrence fails, these weapons could enhance NATO's capability to use nuclear weapons effectively and with restraint.

These modernized weapons provide significant improvements in the range, accuracy and reliability of warhead yield in the case of AFAPs, and for both LANCE and AFAPs provide improvements in command and control, as well as safety and security improvements over older nuclear weapons. They, therefore, contribute to stability through greater operational control, survivability, reliability, and flexibility in use.

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FLEET AIR DEFENSE SYSTEMS

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
64303N	Area Air Defense
64352N	New Threat Upgrade
64353N	Vertical Launching System
64365N	[Deleted]
64366N	STANDARD Missile Improvements
DOE Program	W81 [Deleted]
Procurement	RIM-66B STANDARD MR
Procurement	RIM-66C STANDARD MR
Procurement	RIM-67B1/67C1 STANDARD ER
Procurement	Surface Missile System Ordnance Alteration, Air Defense, TERRIER
Procurement	SMS Ordnance Alteration, Air Defense, TARTAR

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STANDARD missiles are ship-launched, surface-to-air missiles (SAMs) intended for surface combatant defense against air-breathing threats. Improvements, such as stand-off jammer suppression, vertical launching systems, and nuclear warheads, are intended to counter new, more capable air-breathing threats to warships.

II. PROGRAM DESCRIPTIONS

A. Capabilities.

Several versions of the STANDARD Missile (SM), the primary family of fleet air defense SAMs, are currently operational in about 60 ships and programmed for over [deleted] ships through the 1980s. SM-1 MR (RIM-66B), the medium range (MR) version of the first operational SM, is deployed in guided missile cruisers (CGs), destroyers (DDGs), and frigates (FFGs) equipped with TARTAR fire control systems and provides intercept capabilities at altitudes up to [deleted] and slant ranges out to [deleted]. SM-1 ER (RIM-67B1), the extended range (ER) version, is deployed in cruisers and destroyers equipped with TERRIER fire control systems and provides intercept capabilities at altitudes up to [deleted] and slant ranges out to [deleted]. Both medium and extended range versions of the SM-1 are equipped with semi-active guidance. The SM-1 also has a limited, secondary surface-to-surface capability.

An improved version of the STANDARD Missile, the SM-2, has been developed for use with the AEGIS weapons control system (WCS) on CG-47 TICONDEROGA class cruisers, TERRIER guided missile

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fire control system (GMFCS) cruisers, and TARTAR GMFCS cruisers and destroyers. Like its predecessor, two versions of the SM-2 exist -- SM-2 MR (RIM-66C) has a range of [deleted] and SM-2 ER (RIM-67C1) a range of [deleted]. Other improvements are a mid-course guidance capability, an inertial reference system, and greater resistance to electronic countermeasures (ECM). They also retain a limited surface-to-surface capability.

Early SM-1 MR serial improvements were made to guidance, fuze, and autopilot subsystems while retaining the stock guidance and propulsion system. Later production improvements were made to improve ECM, weaving target intercept, motor thrust, target detection device, and warhead capabilities.

The SM-1 and SM-2 use common steering control units, propulsion, fuze, warhead, and airframe surfaces. SM-2 MR development efforts have led to an [deleted] , inertial reference unit, and mid-course guidance unit.

The most difficult target currently facing US naval SAMs are the Soviet [deleted]. These cruise missiles characteristically attack from [deleted]. Efforts to successfully counter this threat are being carried out under the New Threat Upgrade (NTU) Program and are directed at developing: (1) modifications to the basic TERRIER and TARTAR CG/SM-2 combat system design; (2) a high speed version of the SM-2; (3) a more lethal fuze/warhead combination for STANDARD Missiles;

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and (4) a new rocket motor for the medium range version of the SM-2.

Concurrent with efforts to improve missile performance, other programs are aimed at improving supporting systems. Soviet stand-off jamming of naval defensive radars poses a serious threat which must be eliminated or reduced to levels consistent with effective fleet defense [deleted]. The fleet must also be able to defend itself against coordinated high density attack initiated from many quadrants. Therefore, radar performance, threat information processing, defense fire control reaction time, and defensive missile refire times must be improved. One project of a continuing nature addresses changes in TERRIER and TARTAR systems on guided missile cruisers and destroyers and frigate fire control systems necessary to enhance the effectiveness of improved STANDARD missiles. Reductions in [deleted] are being emphasized. A separate project is concerned with a New Threat [deleted] Upgrade development program for nuclear powered guided missile cruisers (CGNs) with SM-2 and for DDG-993 KIDD class guided missile destroyers. In general, this upgrade emphasizes ability to detect, track, and engage [deleted] threats in severe ECM environments and support SM-2 missiles in the engagement of these threats [deleted].

A companion to the air defense program will develop a system that enables surface combatants to engage airborne, surface, and subsurface targets flexibly from modules of vertical

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launch tubes, thus eliminating launcher reload requirements while retaining a variety of anti-submarine, anti-aircraft, and cruise missiles in almost immediate launch readiness. This vertical launching system, under development, can be used in conjunction with the AEGIS WCS and the SM-2 MR. The AEGIS WCS is an integrated air defense system built around a multi-function phased-array radar. It is designed to search for and detect targets, provide fire control solutions, and transmit mid-course guidance commands for simultaneous engagement of up to [deleted] targets.

The AEGIS/SM-2 MR system is to be deployed on CG-47 TICONDEROGA class cruisers. IOC will be in [deleted] and [deleted] ships are to be delivered by the end of [deleted]. Total build of this class is presently set at 24. The first five ships will have the dual-arm MK-26 missile launcher and the remainder will have a vertical launch system. TARTAR/SM-2 MR capability will also be deployed during this period on [deleted] CGN-38 VIRGINIA class cruisers, the [deleted] CALIFORNIA class (CGN-36) cruisers, and the [deleted] KIDD class (DD-993) destroyers. Before CG-47 anti-air warfare (AAW) cruisers can be deployed in increasing numbers, [deleted] ships of the DDG-2 ADAMS class will be modernized with improved TARTAR/SM-1 MR capability. TARTAR/SM-1 MR will also be deployed on FFG-7 PERRY class frigates during this period. Total procurement planned for this class is 59 ships. TERRIER/-SM-2 ER systems will be deployed on [deleted] of the CG-16 LEAHY and CG-26 BELKNAP class ships plus the [deleted].

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In addition to the various versions of conventionally-armed missiles discussed thus far, there is a [deleted]. Production of the W81 was deferred in 1980 pending completion of a study of military need and arms control impact. Funds for nuclear SM-2 [deleted] development were included in the FY 1981 and 1982 revised budgets. [Deleted] warheads are planned in both the DOE and DOD budgets; the specifics occur (as with all nuclear production) when the [deleted].

B. Program Status.

Funding is being requested in FY 1983 for procurement of 650 SM-1s MR; 150 SM-2s MR; and 450 SM-1s ER/SM-2s ER. Under PE 64366N during FY 1983: developmental and operational flight testing of SM-2 MR will be completed; fabrication will continue

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on MR flight test vehicles; 24 SM-2s MR will be delivered for CG-47 testing; three SM-2s MR will be delivered for CGN/TARTAR testing; ten SM-2s MR will be delivered for vertical launch AEGIS testing; ten ER flight test round firings are planned at-sea; ten MR flight test rounds for vertical launch AEGIS WCS firings are planned at-sea; and SM-1 rocket motor development and qualifications will be completed and released for production. Combat system improvements would be continued.

During FY 1983, W81 warhead section design of the [deleted] will continue under PE 64365N.

Under PE 64353N, a vertical launch systam module will be installed in a DD-963 SPRUANCE class destroyer and interface compatability test firings with SM-2 will take place.

FY 1983 PE 64372N activity includes complete TARTAR electronic counter countermeasures (ECCM) integration testing of modifications and procurement of limited production systems for TERRIER ships and TERRIER ship system trainers. System integration and certification for SM-2 will also be performed as well as beginning development of modifications to provide compatability with NTU sensor systems and SM-2. Reliability and maintainability modifications will continue and engineering development of the coherent transmitter and integration with the engineering development model for at-sea testing will be completed. Integration and certification of a CGN/SM-2 GMFCS modification will be completed and modifications of this system to provide compatability with upgraded sensor systems and the SM-2 will begin.

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Under PE 64373N during FY 1983, engineering development will commence to improve the weapon direction system and a long term major upgrade of the GMFCS for FFG-7 OLIVER HAZARD PERRY class frigates will be assessed; modifications to AEGIS WCS would continue; at-sea testing of the AEGIS WCS engineering development model with SM-2, the vertical launch system, and battle group anti-air warfare coordination would be supported; and subsystem testing, qualification, and limited production decisions will continue.

III. STATED MILITARY REQUIREMENTS

Among the more formidable threats to naval battle groups are conventional and nuclear warhead anti-ship cruise missiles. Added to the threat posed by the technical capability of these missiles is the [deleted] ability to perform coordinated attacks nearly simultaneously from widely separated directions and from a variety of launch platforms, i.e., aircraft, surface combatants, and submarines. Cruise missile defense is also complicated by the fact that some [deleted], use a high altitude steep diving angle attack. Battle groups of the future must be able to defend against coordinated, multiquadrant, bilevel attacks.

The primary air-launched Soviet cruise missile threats are the AS-4 KITCHEN, launched from either the Tu-22 BLINDER or the Tu-22M BACKFIRE bombers, and the AS-6 KINGFISH, carried and launched from the Tu-16 BADGER bomber. Both cruise missiles can

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be launched from stand-off ranges in excess of [deleted], fly inbound at [deleted].

Ship-launched Soviet cruise missiles of concern to naval planners include the [deleted], SS-N-12 SANDBOX, SS-N-9 SIREN, and SS-N-7. The [deleted]. After launch, possibly up to [deleted] from targets, they climb to [deleted]. These cruise missiles are believed to be equipped with [deleted] are the SS-N-7, [deleted]. The SS-N-7 has a range of about [deleted], a cruise altitude of [deleted], and a speed of Mach [deleted].

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The SS-N-9 has a range of about [deleted] and cruises at [deleted] at about [deleted].

All of these Soviet cruise missiles are believed able to carry either conventional high explosive or nuclear warheads. The specific yields for the optional nuclear warheads [deleted] are likely since this range of yields suits the anti-ship mission and postulated payloads of these missiles.

Programmed and developing improvements to fleet air defense weapons control systems and associated SAMs would give the US Navy significantly greater capabilities to deal with projected cruise missile threats, particularly in scenarios involving massed coordinated raids against US battle groups operating without support of naval aviation or within range of Soviet Naval Aviation bases. STANDARD missiles launched from guided missile cruisers, destroyers, and frigates and controlled by upgraded TARTAR GMFCSs, TERRIER GMFCSs, and AEGIS WCSs would provide intercept capabilities to [deleted] and at altitudes up to [deleted].

If upgraded weapons control and GMFC systems, longer-range SAMs, vertical missile launchers, and a nuclear warhead for SAMs were not developed and deployed, the Navy would be much less capable of defending against [deleted]. This would be true particularly of those surface elements operating independently of aircraft carriers. Not countering the new Soviet

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cruise missile threats to the fleet could result in reduced flexibility for US naval operations thus constraining the options available to policy-makers in future crises.

The kill mechanism of the two types of conventional STANDARD missile warheads are either the [deleted]. Against air targets, the aerodynamic damage probability of both warheads depends upon a number of factors including target hardness, engagement geometry, and fuzing, but tends to fall off rapidly when miss distances exceed [deleted]. The conventional missile has a [deleted]. The prime advantage of a nuclear warhead is its ability to destroy attacking [deleted] to greatly extended lethal radii. In spite of the considerable conventional capability of planned and improved SM-2 systems, these missiles may be [deleted]. Therefore, the Navy is re-emphasizing development of the [deleted]. The rationale for an [deleted] is that, while the conventionally-armed SM-2 could successfully intercept and [deleted]

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[deleted].

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IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Area Air Defense (PE 64303N)										
Development $	37.9	34.2	8.2	8.4	Cont.					
Production $	(Not Applicable)									
New Threat Upgrade (PE 64352N)										
Development $	62.6	42.5	45.3	45.0	Cont.					
Production $	(Not Applicable)									
Vertical Launching System (PE 64353N)										
Development $	120.7	70.4	33.9	26.8	Cont.					
Production $	(Not applicable)									
[Deleted] (PE 64365N)										
Development $	12.9	13.2	18.8	18.8	TBD					
Production $	(Not applicable)									

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IV. FUNDING ("then year" $ in millions) (Cont.)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
STANDARD Missile Improvements (PE 64366N)										
Development $	140.5	50.6	50.8	62.4	Cont.					
Production $	(Not Applicable)									
W81 [Deleted] (DOE Program)										
Development $	[Deleted]									
Production $	[Deleted]									
RIM-66B STANDARD MR (Procurement)										
Development $	92.0	15.7	10.4	10.0	10.4	139.1				2090.6
Production $	740.7	170.2	260.8	264.2	743.8		2179.7	9260	0.235	
RIM-66C STANDARD MR (Procurement)										
Development $	116.7	24.6	18.6	17.3	35.7	207.9				971.1
Production $	64.4	62.7	125.0	208.1	1928.2		2388.3	4170	0.573	

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IV. FUNDING ("then year" $ in millions) (Cont.)

	FY 81 & Prior	FY 82	FY 83	FY 84 (est)	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
RIM-67B1/RIM-67C1 STANDARD ER (Procurement)										
Development $	209.9	11.5	9.4	16.7	33.7	280.3				2622.9
Production $	660.9	223.4	310.0	359.0	1356.7		2910.1	6931	0.420	
SMS TERRIER (Procurement)										
Development $										
Production $	84.7	37.8	NA	NA	NA					
SMS TARTAR (Procurement)										
Development $										
Production $	38.1	53.6	NA	NA	NA					

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Upgrading conventional fleet air defense capabilities is consistent with US arms control policy. Improvements in missile range, guidance, and ability to deal with multiple targets would reduce the prospective vulnerability of fleet battle groups operating in the projected combined Soviet air, sea, and sub-surface severe threat environment. As such, these programs would improve the US Navy's projected capability to perform a variety of vital missions in peacetime and in war and thereby contribute to the deterrence of war and to international stability. These objectives, of course, are shared by US arms control policy.

The SM-2 MR can be carried by certain ships equipped with the modified TARTAR launching system. [Deleted] AAW capability for the first time. These modifications, in addition to the planned procurement of AEGIS WCS-equipped ships carrying [deleted], would revise the decline underway since 1968 in the number of platforms equipped with nuclear-capable air defense systems (see TABLE 1).

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TABLE 1: Numbers of Ships with Nuclear AAW Capability

Nuclear System	1970	1980	1988 (est)
TARTAR/SM-2 MR	0	0	[Deleted]
TERRIER/BTN	37	32	[Deleted]
TERRIER/SM-2 ER	0	0	[Deleted]
TALOS	7	0	[Deleted]
AEGIS/SM-2 MR	0	0	[Deleted]
Totals	44	32	[Deleted]

B. Relation to Arms Control Agreements.

The United States is not a party to any arms control agreement which restricts deployment of naval AAW weapons or their supporting systems.

Deployments of CG-47 TICONDEROGA class ships equipped with the [deleted] should not set precedents for interpretation of Article VI of the Anti-Ballistic Missile (ABM) Treaty. Article VI of the Treaty provides that neither side is to give "capabilities" to counter strategic ballistic missiles to other than ABM*** missiles, launchers, or radars, but does not define the meaning of "capabilities" in specific terms. Article VI also provides that non-ABM missiles, launchers, and

---

[Deleted].

** LONG BEACH (CGN-9) carried both TERRIER and TALOS. TALOS was removed but the ship will retain a [deleted].

*** ABM is synonymous with ballistic missile defense (BMD).

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radars will not be tested in an "ABM mode". There is agreement that the [deleted] would have essentially no capability against strategic ballistic missiles. The system also would not be tested in an "ABM mode".

In assessing the ABM potential of Soviet air defense systems, the US uses observable characteristics such as [deleted] as major technical indicators of such capabilities. In its planned configuration, the AEGIS WCS would have observables of about [deleted].

The provision in Article VI which prohibits giving non-ABM missiles, launchers, or radar an ABM capability was included in the ABM Treaty at US insistence to prevent the Soviets from circumventing the limits on ABMs by giving their widely deployed SAM systems an ABM capability. In the ABM Treaty negotiating record the US set forth a list of indicators for judging whether a SAM system had an ABM capability. These indicators included phased-array radar and nuclear-armed interceptors. The US and USSR have previously deployed nuclear armed air defense systems. However, [deleted] would represent the first US mating of a non-ABM nuclear interceptor with a phased-array radar system.

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The Soviets have deployed SAMs with phased-array radars. [Deleted]. For example, the Soviet [deleted]. Further similarities exist between the [deleted]. On the basis of the comparability of the [deleted].

It is in the US interest for both parties to the ABM Treaty to avoid steps which would make verification of the Treaty more difficult.

It would be very desirable, although difficult, to differentiate among those modern defense systems intended for defense against air-breathing, tactical ballistic missiles, or strategic ballistic missile threats. To constrain US programs without firm categorization criteria could result in the US being

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more self-constrained than the Soviet Union in developing high performance air defense systems.

In summary, [deleted] would not be precluded by the ABM Treaty, and is consistent with US arms control obligations. The arms control concern expressed by some in the mid-to-late 1970s that its deployment might lead to [deleted] is no longer justifiable in light of [deleted].

C. Effect on Current and Prospective Negotiations.

The AEGIS WCS with conventionally armed interceptor missiles is not likely to have an impact on any current or prospective arms control negotiations.

Planned development of the W81 warhead is scheduled for completion by [deleted].

The US has been engaged in Comprehensive Test Ban Treaty (TBT) negotiations with the UK and USSR. These negotiations were recessed in November 1980 without setting a resumption date. [Deleted].

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D. <u>Effect on Global and Regional Stability</u>.

The conventional AEGIS/SM-2 system is designed to improve the Navy's air defense capability, thereby improving the conventional combat capability of the fleet and its ability to deter war, and thus enhancing global and regional stability.

Judgments as to the probable impact of deploying [deleted] hinge on assessments of the potential effects of the system on deterring attacks on US naval forces, on the defeat of nuclear attacks on US naval forces, and on Soviet assessments of the likelihood that the US would employ nuclear-armed missiles to defend naval forces.

The US believes it is important to retain a nuclear air defense capability on US surface combatants to be able to threaten a nuclear defense and to also increase the chances of surviving a Soviet nuclear attack on US naval forces [deleted]. Uncertainty in the minds of Soviet planners as to how the US might respond to hostile actions and how successful such attacks might be -- because of the presence of [deleted] aboard US warships -- will serve to strengthen deterrence of such attacks in time of crisis.

The possibility of other US responses to an attack on a high-value target such as a carrier battle group would pose additional uncertainties for Soviet planners. A US response might not be limited to direct defense. It is the certainty of some response, but uncertainty about its form, that underpins nuclear deterrence on the one hand, and flexible response, on the other.

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If a theater-level war -- conventional or nuclear -- broke out, the [deleted]. The initial attack might not be nuclear, depending upon [deleted].

[Deleted]. This possibility then could increase Soviet incentives to exercise forbearance in the use of nuclear weapons against US naval forces.

US naval forces that were only equipped with conventional defenses would present more vulnerable targets for air-launched Soviet attacks. [Deleted]. Whether the use of nuclear weapons over an ocean area would lead directly to escalating the associated land campaign is unknown.

Thus, while it can be argued that Soviet perceptions of US naval strengths or vulnerabilities could lead to Soviet use of nuclear weapons, it is US belief that US naval nuclear SAMs could reduce the likelihood of Soviet use of nuclear weapons.

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E. Technological Implications.

The AEGIS WCS uses a phased-array radar. Its ability to track and engage large numbers of targets simultaneously exceeds that of existing air defense radars.

The present SM-2 represents a [deleted]. Following the initial boost, the [deleted]. At the extremes of [deleted]. The improved SM-2, however, would correct these deficiences.

The Soviets could attempt to offset the AEGIS/SM-2 system by deploying higher performance missiles and offensive aircraft in conjunction with improved ECM.

In the 1950s and 1960s many air defense systems were armed with nuclear warheads to compensate for expected miss distances outside the lethal range of conventional warheads. Recently, more sophisticated air defenses (IMPROVED HAWK, PATRIOT, and modern air-to-air missiles) have been developed which are able to destroy their targets with modern conventional warheads. The obvious advantage is that, being less constrained by political considerations and costs, they offer greater utility in a wide spectrum of circumstances. Thus, non-nuclear kill is preferable. [Deleted]

89-844 O - 82 - 17

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[deleted].

F. Potential Interaction with Other Programs.

The interactive implications of AEGIS WCS deployment with the [deleted] were discussed in Section V B. above.

G. Verification.

[Deleted].

[Deleted] the multi-purpose vertical launch system which would be able to fire nuclear and conventionally-armed SM-2s, TOMAHAWK long-range cruise missiles, ASW standoff weapons (SOWs), and conventionally-armed short-range HARPOON cruise missiles. [Deleted], any ship employing the externally identical vertical launch

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system could be challenged just as all STANDARD Missile-capable ships will be suspected of carrying [deleted] is deployed.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The AEGIS/SM-2 system with only conventionally-armed interceptors had no adverse arms control implications. [Deleted]. However, both systems, by increasing the air defense capabilities of the fleet, would improve the stability of the force balance between the US and USSR and give the Navy increased flexibility of operation in future crises. These two effects should serve to strengthen the deterrence of war and enhance international stability.

In conjunction with the [deleted] could provide fleet commanders with the ability [deleted] system in itself would be consistent with US arms control obligations and deployment of the system should not [deleted] the concept of identical launch tubes for several types of missiles may complicate verification. These and other arms control aspects must be weighed within the overall need to assure that our limited naval assets remain a viable force.

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MEDIUM-RANGE AIR-TO-SURFACE MISSILE

I. INTRODUCTION

This Arms Control Impact Statement (ACIS) addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
63369N	Tactical Air-Launched Cruise Missile
64614F	Medium-Range Air-to-Surface Missile
27164F & Procurement	Medium-Range Air-to-Surface Missle

The medium-range air-to-surface missile (MRASM) is a conventionally armed, tactical cruise missile for both anti-ship and land-attack employment. The Joint Cruise Missile Project Office (JCMPO) managing the MRASM program is developing joint services conventional air-to-surface standoff missiles capable of all-weather attack against heavily defended high-value fixed targets. The MRASM is an adaptation of the AGM/BGM-109 TOMAHAWK cruise missile. The MRASM program includes both Navy and Air Force variants -- the Navy's AGM-109L and the Air Force's AGM-109H.

II. PROGRAM DESCRIPTIONS

A. Capabilities.

Two variations of the MRASM have been identified for conformance with the different target priorities and operating

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constraints required by the Navy and the Air Force. These variations -- both land-attack -- will employ a turbojet propulsion system with a straight-line fuel exhaustion range of under 600 kilometers and use terrain contour matching (TERCOM) for enroute navigational updates. Pertinent characteristics of the MRASM and other TOMAHAWK adaptations are summarized in Table 1.

TABLE 1 TOMAHAWK CHARACTERISTICS

Cruise Missile	Payload	Fuel Exhaustion Range (km)	Type	Length (inches)	Length Difference from GLCM (inches)	Wing Type	Engine
GLCM (BGM-109G land-attack)	nuc.	[deleted]	TOMAHAWK	219		straight	turbofan
TLAM-N (BGM-109A land-attack)	nuc.	[deleted]	TOMAHAWK	219	none	straight	turbofan
TLAM-C (BGM-109C ship-launch)	conv.	[deleted]	TOMAHAWK	219	none	straight	turbofan
TLAM-C (BGM-109C sub-launch)	conv.	[deleted]	TOMAHAWK	219	none	straight	turbofan
MRASM (Air Force AGM-109H air-field-attack)	conv.	[deleted]	TOMAHAWK	232	13	straight	turbojet
MRASM/TALCM (Navy AGM-109L land-attack)	conv.	[deleted]	TOMAHAWK	192	27	swept	turbojet

As indicated, the Navy MRASM is 192 inches long. It weighs about [deleted] and has 15 degree swept wings to adjust

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the aerodynamic characteristics of the missile created by the shortened fuselage. It will use TERCOM for enroute navigational updates [deleted].

The Navy MRASM has been designed for an operational range of about [deleted]. The installed [deleted] originally produced for the [deleted] missile, is designed to penetrate concrete structures.

The Navy intends to use the A-6 as the primary MRASM launch platform. The A-6 could carry four MRASMs on wing-mounted external stores stations; [deleted].

The Air Force airfield-attack AGM-109H MRASM has an operational range of about [deleted]. This weapon employs a [deleted] warhead. The submunitions being developed by Lawrence Livermore National Laboratory would [deleted] which is designed to inhibit operational use of runways and taxiways. The Air Force [deleted]. MRASM's standoff capability would reduce risk to manned aircraft and allow attack of runways; operating bases; aircraft shelters; maintenance, supply, and storage facilities.

The length of the Air Force MRASM is 232 inches to

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accommodate the proposed ordnance. It is expected to weigh approximately 2900 pounds and will have the standard TOMAHAWK straight-wing design. Guidance would be by TERCOM for the mid-course phase of the flight path [deleted].

The aircraft proposed to carry the Air Force MRASM are the B-52 and possibly the F-16 as a secondary carrier. Anticipated carriage on the B-52 is either twelve or twenty missiles. The most likely F-16 combat load is two missiles. Four MRASMs could conceivably be carried, but combat maneuverability would be unacceptably restricted.

C. Program Status.

1. AGM-109H. The baseline MRASM program was intended to achieve a FY 1985 initial operational capability (IOC) for the AGM-109H; due to funding restraints, an [deleted]. Included in the baseline program is integration of the missile on the B-52 and an investigation of the F-16 as a MRASM launch platform.

The FY 1983 program consists of integration of the guidance system, warhead, and airframe to accomplish initial development testing.

The FY 1984 program is scheduled to include the conduct of Development Test and Evaluation and Initial Operational Test and Evaluation of the AGM-109H to include free-flight tests delivering complete patterns of live submunitions against runway type targets.

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2. AGM-109L. The programmed IOC for the AGM-109L [deleted]. The Navy zeroed the program in March 1981. In July 1981 the Congress authorized monies to reactivate development. The Navy plans to enter Full Scale Engineering Development in the [deleted] looking to an initial missile delivery in [deleted].

III. STATED MILITARY REQUIREMENTS

The Navy and Air Force will each have MRASM variants for their particular needs. The Navy land attack MRASM program is intended to improve the Navy's capabilities for standoff attack of ships, port facilities, naval supply centers, and other naval infrastructure hard-point or soft-area targets.

The Air Force's airfield attack MRASM is intended to aid the mission of gaining air superiority by denying use of enemy airfields and destroying aircraft support facilities. [Deleted].

The warheads under development are conventional and are designed to meet mission requirements as well as the physical constraints imposed by the missile and the requirement for maximum commonality with the basic TOMAHAWK cruise missile design.

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IV. FUNDING ("then year" $ in millions)

	FY 81 & Prior	FY 82	FY 83	FY 84 EST	FY 85 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Medium-Range Air-to-Surface Missile (MRASM)										
PE 63369N										
Development $	44.6	19.0								
Production $	-	-								
PE 64614F										
Development $	14.0	48.9								
Production $	-	-				DELETED				
PE 27164F										
Development $	-	-								
Production $	-	-								

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V. ANALYSIS

A. <u>Consistency with US Arms Control Policy and Related Presidential Decisions</u>.

The development and production of conventionally-armed cruise missiles are consistent with US arms control policy. The MRASM would provide an improved conventional capability to disrupt such activities as airfield operations (accomplishing a mission curently performed by penetrating aircraft), to contribute towards the creation of maritime superiority required to put Soviet naval forces at risk, and to project forces worldwide. In general, conventional force improvement programs of which MRASM is a part, are meant to strengthen deterrence and regional stability. Since they enhance NATO's conventional posture they also support US arms control policy by making the necessity to resort to nuclear weapons in the initial phase of a NATO-Warsaw Pact conflict somewhat less likely. Also, by improving US capabilities worldwide, they further support deterrence.

B. <u>Relation to Arms Control Agreements</u>.

The SALT II Treaty, which was to have run through 1985, was signed on June 18, 1979, but has not been ratified. The SALT II Protocol was to have expired at the end of 1981.

A comprehensive interagency review of US strategic arms control policy is currently underway. While it is the position of this administration that the SALT II Agreement will not be ratified in its present form, the US has indicated that pending completion of this review, it will take no action that would undermine the

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SALT II Agreement as long as the Soviets exercise the same restraint. There are several provisions of the SALT II Agreement pertinent to air-launched cruise missiles (e.g., definitions, range capabilities/determination, platform distinguishability for accountability purposes) which would have implications for US cruise missile programs if the treaty entered into force.

The major SALT II-MRASM implications are summarized below:

Implications of SALT II Range Restrictions.

The SALT II Agreement would have limited only those air-launched cruise misiles with fuel exhaustion ranges (max range possible when missile is flying in its standard design mode) of over 600 km. Since the fuel exhaustion range of the MRASM, when launched from an aircraft, is under 600 km, it would not have been considered a long-range cruise missile under the terms of the SALT II Agreement.

[Deleted].

Implications of SALT II Distinguishability Rules.

The SALT II Agreement would have required that MRASMs be distinguishable from long-range cruise missiles on the basis of externally observable design features. [Deleted]

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[deleted].

The MRASM airframe is observably different from the Boeing AGM-86B ALCM airframe. As Table 1 indicates, the Navy MRASM is 27 inches shorter than the ground- and sea-launched versions of the TOMAHAWK Cruise Missile and incorporates a swept wing design. The Air Force MRASM is 13 inches longer than the GLCM/SLCM and has the same airframe. [Deleted].

[Deleted].

C. <u>Effect on Current and Prospective Negotiations</u>.

[Deleted]. Moreover, since MRASM is a medium-range, conventionally-armed system, it should not be subject to limitation in future negotiations on strategic systems.

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D. Effect on Global and Regional Stability.

The effects of MRASM deployment upon global and regional stability are imprecise. By helping to neutralize the threat that Warsaw Pact aircraft pose to Western Europe, MRASM could have a positive effect on global and regional stability.

[Deleted].

E. Technological Implications.

The United States [deleted]. Neither the land attack nor the airfield attack MRASM configrations represent a wholly new type of weapon. Their lineage goes at least as far back as the V-1 "Buzz Bombs" of World War II and, more recently, the less advanced anti-ship cruise missiles possessed by the Soviet Union. The MRASM represents the integration of a series of improvements in a number of technologies. It is, therefore, doubtful that MRASM alone will have significant technological implications, but will contribute along with the remainder of

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the cruise missile family to developing a climate which could evoke responses from the Soviets and/or others.

Possible Soviet Responses.

[Deleted].

The Soviets currently have a substantial number of tactical air-launched cruise missiles, [deleted]

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[deleted]. The Soviets have had several variations of anti-ship and short-range land-attack air-to-surface cruise missiles deployed for many years. While the Soviets, in response to the MRASM program, could decide to develop a cruise missile of similar size and capability, it is more likely that such an attempt on their part would be the result of their own military requirements.

[Deleted].

[Deleted]

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[deleted].

Other Responses.

[Deleted].

While the increased capabilities of advanced cruise missiles might make their production militarily and politically attractive to some nations, it seems unlikely that, except in a few cases, such programs would be undertaken. [Deleted]. The current non-US systems could undoubtedly be upgraded, but the limited research, development and production bases of many nations, coupled with the high cost of developing advanced cruise missiles, make them an unattractive acquisition option for all but a select few. Manned aircraft are currently more readily available and are sufficiently flexible delivery systems to meet the present needs of most states.

Similarly, most smaller countries would not seek a conventionally -armed air-launched cruise missile because of the large numbers of cruise missiles which would be required for the

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same task as a smaller number of manned aircraft which possess some stand-off capability and can deliver greater payloads and more varied munitions.

Development of cruise missiles similar to the US MRASM could present formidable technical obstacles to many states. A country must possess the technology to develop lightweight, compact engines, or must otherwise acquire them. There is a further requirement for considerable sophistication in aerodynamics and micro-miniaturized guidance systems as vulnerability to air defense requires that cruise missiles follow the terrain at low altitudes in the terminal stages of flight. Moreover, if terrain contour matching is desired for high accuracy, a sophisticated reconnaissance and mapping capability would also be required. Should these missiles be designed as nuclear systems, there is the further problem of fabricating small nuclear weapons.

Recognizing that these and other technological barriers could be prohibitively expensive and difficult for many countries, it must be acknowledged that some countries may intend cruise missiles for less demanding missions (reduced accuracy requirements; penetration of less effective air defense systems) than those visualized by the United States. In this case, development of a relatively unsophisticated cruise missile may be seen as practical.

It is also possible that alternative methods may be achieved to overcome current technological barriers. [Deleted]

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[deleted].

F. <u>Potential Interaction with Other Programs</u>.

In terms of power projection, the mission of the MRASM could include support of engaged friendly forces and deep interdiction. The Air Force's AGM-109H airfield attack MRASM would complement that role by destroying airfields, depots, and communications sites servicing enemy aircraft. In conjunction with surface-to-air and air-to-air defense systems, the AGM-109H MRASM could aid the mission of gaining and maintaining air superiority. Finally, the airfield attack MRASM could provide an improved capability to attack targets conventionally, thus enhancing NATO'S conventional posture, and, thereby making the necessity to resort to nuclear weapons less likely.

G. <u>Verification</u>.

Verification of compliance with provisions of the SALT II Agreement would require such monitoring tasks as determining ranges, and distinguishing MRASMs from long-range cruise missiles, (so that MRASMs do not become SALT-accountable as long-range cruise missiles). If the SALT II provisions were applicable into the future the following judgements apply:

- [Deleted].
- [Deleted]

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[deleted].

- [Deleted].
- [Deleted].
- [Deleted].
- [Deleted].

It should be noted that if negotiated cruise missile constraints were more severe, future arms control agreements could conceivably require more encompassing and stringent cooperative measures in order to assure adequate verification.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The development and acquisition of conventionally-armed cruise missiles are consistent with US arms control policy. They

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offer the potential to help offset the serious threats posed by Soviet warships and Warsaw Pact aircraft to our ability to carry out wartime missions. In this sense, MRASM could enhance the credibility of our defense commitments abroad.

The land-attack MRASM provides an improved conventional capability to accomplish missions currently being performed by penetrating aircraft. As such, the deployment of MRASM could serve to enhance NATO's conventional posture, and, thus could make less likely NATO's resort to nuclear weapons in a NATO-Warsaw Pact conflict.

[Deleted].

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CHEMICAL WARFARE

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
62622A	Chemical Munitions and Smoke Munitions
62706A	Chemical/Biological Defense and General Investigation
62734A	Medical Defense Against Chemical Agents
63615A	Lethal Chemical Munitions Concepts
63721A	Chemical Defensive Materiel Concepts
63751A	Medical Defense Against Chemical Warfare
63752A	Demilitarization Concepts
64610A	Lethal Chemical Munitions
64725A	Chemical Defense Materiel
65804A	DARCOM Ranges/Test Facilities
63745F	Chemical Warfare Defense
64601F	Chemical/Biological Defense Equipment
62764N	Chemical/Biological/Radiological Defense Technology
64506N	BW/CW Countermeasures
64604N	Chemical Warfare Weapons
Procurement	Chemical Defense Equipment
	Stockpile Maintenance

US ratification of the Geneva Protocol and the Biological Weapons Convention (BWC) indicates a US commitment to the objective of the complete, effective, and verifiable prohibition of all chemical weapons. The BWC commits the states which are parties to the convention to continue negotiations towards prohibition of chemical weapons. The US will continue to participate in efforts aimed at eventually concluding a chemical weapons prohibition.

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From 1977 to 1980, interagency reviews resulted in Presidential decisions to maintain our chemical warfare (CW) deterrent retaliatory forces without force improvement. The House and Senate, at their own initiative, authorized partial funding for FY 1981 to construct the initial phase of an Integrated Binary Munition Production Facility. The Reagan Administration included funds in the FY 1981 Budget Supplemental to provide equipment for the binary chemical munitions facility. Congress subsequently authorized these funds. The decision to construct a binary facility is not a commitment to production. This is the first phase of a program which will allow production of binary chemical weapons in FY 1984 if the decision is made to do so.

No funds have been requested in the past for actual production of binary munitions, but FY 1976 authorization legislation requires prior Presidential certification and notification to Congress before binary weapons can be produced.

When the House/Senate Conference addressed BIGEYE funding ($1.87M) in the FY 1981 Revised Supplemental, the Conference Committee agreed to fund initiatives in chemical weaponry, but remained deeply concerned about the many unanswered questions surrounding the effort. Therefore, the Committee directed the Administration to determine the long-range costs of the CW modernization program and provide a country-by-country report from our NATO allies with respect to their official views on that long-range program. The Committee felt that the information provided so far had been insufficient. The Committee also believed it imperative that the Administration provide an

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overview of the mission-oriented requirements for the various binary weapons, as well as an arms control impact study of such requirements before further funding is approved.

The proposed FY 1983 CW Program (i.e., active RDT&E of both deterrent retaliatory and defensive CW programs; procurement of an improved protective CW capability; initiation of actions needed to modernize the US deterrent retaliatory capability and to dispose of the deteriorating chemical agent stockpile; and maintenance of chemical munitions) provides the basis for this analysis. This program supports the US objective of maintaining an adequate defensive and deterrent retaliatory capability, increasing the safety of the systems involved, as well as eventually concluding a complete and verifiable prohibition of chemical weapons production, development and stockpiling and contributes to negotiations by allowing the US to gain negotiating leverage in the area of chemical weapons arms control. The current program supports our existing, [deleted] chemical weapons deterrent retaliatory stockpile. The amount of retaliatory-related research and development now being funded provides a technological basis for evaluating defensive measures, as well as a basis for modernization of US CW deterrent retaliatory capabilities. The program also retains protective preparations signaling an intent to provide continued protection to our own personnel.

II. PROGRAM DESCRIPTIONS

A. Research, Development, Test & Evaluation.

The Army, as DOD Executive Agency for CW RDT&E, has

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responsibility for conducting a coordinated interservice RDT&E program to provide the essential technology base upon which the Services can develop chemical weapons and chemical defense systems on an individual or joint basis to meet their needs. [Deleted]. Building on this technology base, individual Services then fund engineering development programs to support their unique requirements. FIGURE 1 illustrates the interrelationship of the various CW programs.

For the purpose of this analysis the CW program will be discussed using the following subgroupings: Technology Base, RDT&E in Defensive Materiel, Medical Research, Technical Support of Agent and Munitions Development, and Field Test Activity.

1. Technology Base.

This portion of the program would constitute about 24 percent of the FY 1983 effort.

PE 62706A Chemical Biological Defense (CBD) and General Investigation - This program element supports the entire DOD chemical defense technology base. Exploratory development (XD) of a broad spectrum of equipment concepts is being conducted: (1) to acquire a technological base to counter the threat posed by potential enemy chemical agent/munition systems; (2) to enhance knowledge in all aspects of physical defense, including warning, detection, identification, decontamination, individual and collective protection;

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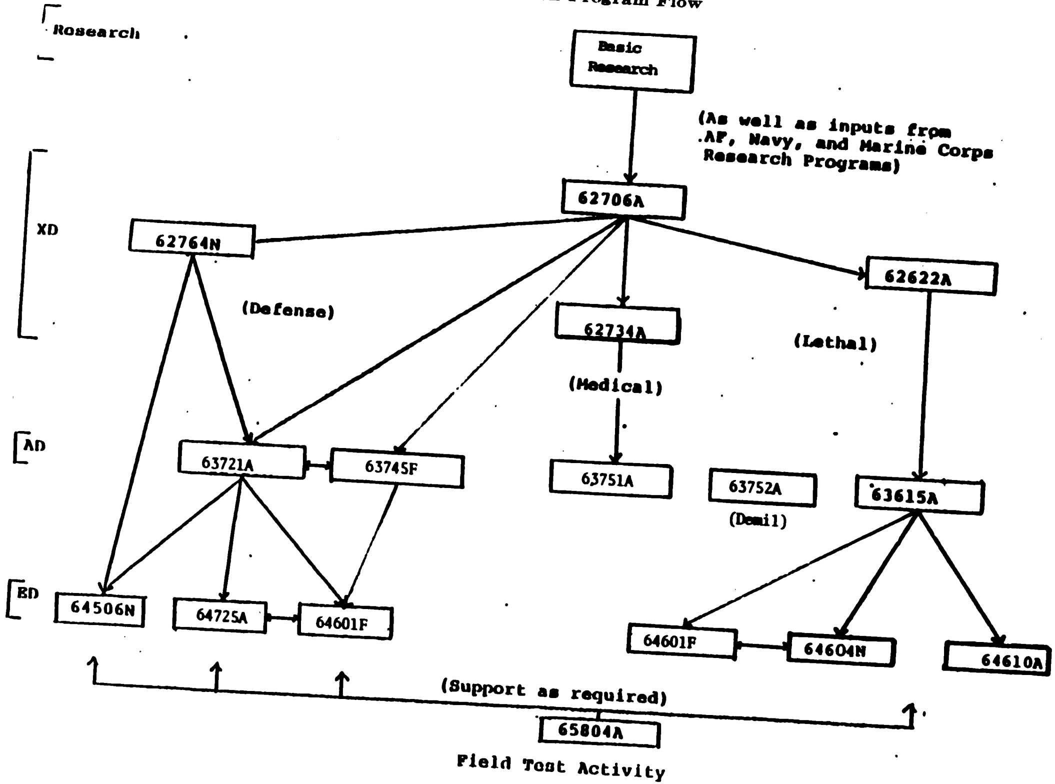
FIGURE 1.—CW RDT&E Program Flow



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(3) to investigate chemical compounds of military interest; (4) to evaluate protection countermeasures, avoid technological surprise, and uncover leads for new retaliatory chemical agents; and (5) to study agents and methodology for the training of troops. This knowledge is also usable in advancing the retaliatory chemical agent/munitions technology. This program also includes investigations supporting both defensive and retaliatory development in chemical dispersion and dissemination techniques, chemical agent systems process chemistry and pilot operations, searches for potential chemical agents, and toxicology of chemical agents. During FY 1983, it is planned to continue to assess the effectiveness of protective and detection systems against all potential threat agents in Service environments. Work on the identification and assessment of candidate persistent and nonpersistent training simulants will be continued. XD will continue on innovative concepts for decontamination, remote detection, monitoring and identification. In addition, XD will be completed on an individual decontamination kit.

PE 62622A Chemical and Smoke Munitions - Investigations under this Army project provide the essential exploratory effort in lethal, incapacitating and riot control agents and munitions and the total technology base for Department of Defense (no comparable work is done by the other Services): (1) Lethal Chemical Agents/Weapons; encompasses research activities associated with physical and analytical chemistry of potential lethal chemical systems; development of binary chemical agents of various degrees of vola-

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tility to be used with a variety of munition types with a resultant capability for air or ground delivery using standard and advanced weapon systems; and research leading to an understanding of phenomena which enhance the threat and effectiveness of these agents; (2) Incapacitating Chemical Agents/Weapons; includes the search for new, safe-to-handle incapacitants with the following properties: higher potency, shorter on-set time, shorter duration of effects, and percutaneous activity; development of effective means for exploitation of these agents; and identification of the physical and chemical characteristics of these agents; (3) Chemical Combat Support Systems; includes development and evaluation of new chemical compounds for riot control agents, development of concepts for their use and the establishment of the feasibility of munitions responsive to the concepts. Specific efforts for FY 1983 would include continued evaluation of: potential dual-purpose (inhalation and skin penetration) lethal agents adaptable to binary delivery;* weaponization concepts for air delivered bombs, air-deliverable mines, cruise missiles, Corps support weapons and extended range artillery projectiles; chemical agent manufacturing processes and environmental control mechanisms; and continued weaponization studies for potential incapacitating agents.

PE 62764M Chemical/Biological Defense Technology -

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* The binary concept is a process which provides for the formation of a lethal chemical agent from two non-lethal constituents by means of a chemical reaction occurring only during flight of the munition to a target. Additional safety and security are achieved by adding the second constituent at the time of preparing the munition for use.

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This program element funds the Navy's efforts in a coordinated Joint Services Chemical, Biological, and Nuclear Radiation Research program. It provides for the formulation of the Navy's operational requirements and for the coordination of these requirements with the Army and Air Force for defense procedures and equipment. Based on RDT&E programs sponsored by other services, the following items would be evaluated in the shipboard environment in FY 1983 for compatibility with Naval functions and operations: (1) new joint service protective mask (complete evaluation and perform final testing); (2) non-corrosive, non-hazardous decontamination material for shipboard use; and (3) Canadian, German and British shipboard collective protection systems as possible candidates for US application. In addition, the interoperability of Navy and Marine Corps equipment and procedures when employed in ship-to-shore operation would be verified, aviation-associated and integrated fleet/shore base chemical/biological defense material requirements would be determined, and survivability and mission-keeping capability criteria for which chemical defense systems are to be designed would be refined. Programs will be continued for the development of electronic local (point) detector and indicator paints and coatings; decontamination solutions and protective coatings; air filtering devices for shipboard collective protection; and CB protective/flame resistant materials, garments and coatings.

2. <u>RDT&E in Defense Materiel</u>.

This portion of the program would constitute about 42

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percent of the FY 1983 effort.

The programs included in this sub-category are directed toward the development of a full spectrum of equipment and materiel required to sustain operations in a chemical environment. More specifically they seek to provide: (1) improved chemical detection, warning and identification materiel and equipment; (2) effective individual and collective protection; and (3) the means to decontaminate personnel and equipment following a chemical attack. Specific efforts for 1983 are as follows:

PE 63721A Chemical Defensive Materiel Concepts - Advanced development (AD) would be completed in FY 1983 on the automatic liquid agent detector, the simplified collective protective system and the hybrid (combination ventilated face mask and positive pressure) collective protection system for armored vehicles. AD would be initiated or continued on the automatic chemical agent detection alarm, the individual decontamination kit, and a remote sensing chemical agent alarm.

PE 63745F Chemical Warfare Defense - This AD program, a new start in FY 1982, is designed to alleviate basic medical and operational problems associated with CW operations. The program will demonstrate improved technology solutions to enhance Air Force capabilities to sustain operations and handle casualties in a CW environment. The FY 1983 planned program would include the developmental test and evaluation of prototype aircrew respirators, resin filters, and liquid-cooled garments. Efforts will be initiated to: (1) develop a prototype vital signs monitor for use in air

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evacuation missions; (2) develop aircrew contamination control procedures; and (3) integrate chemical defense equipment with current life support equipment.

PE 64725A Chemical Defense Materiel - Engineering development (ED) would be initiated on the following: (1) an interior surface decontamination system for vehicles; (2) an improved training simulator; (3) an improved detector kit simulator for use with training simulants; and (4) the Large-Scale Decontamination Device (Jet Exhaust). ED would continue on: (1) the modular collective protection equipment (MCPE) applications to vans, shelters and associated equipment; (2) aerial and ground disseminators for chemical agent attack simulation; and (3) a universal decontaminant.

PE 64601F Chemical/Biological Defense Equipment - This program element contains all ED of Air Force-unique defensive equipment. (There is one project within the PE that funds certification on Air Force aircraft of the Navy BIGEYE binary chemical weapon -- see PE 64604N, Section II A.) The FY 1983 program will continue development of an area detection system. Also in FY 1983 the third generation aircrew protection system will reach ED, the improved collective protection and decontamination systems will undergo AD, and Air Force operational tests of the new joint-Service groundcrew protective mask will take place.

PE 64506N BW/CW Countermeasures - This program element is an ED program that will provide advance warning and automatic point detection of a CW agent attack and provide US Navy ships with a shipboard collective protection system option. Funds were

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approved in FY 1975 to develop a CW advance warning capability for US Navy ships utilizing the Forward Looking Infrared (FLIR) imaging principle. The detection of CW agents can be made with FLIR in its normal mode of operation. The major development effort is directed toward [deleted] CW agent identification and false alarm discrimination. It is planned that the chemical detection portion of this program would be completed in [deleted]. The automatic advance warning system will be comprehensively evaluated for detection, identification and discrimination capabilities in the at-sea and littoral environments for multi-ship application [deleted]. Shipboard installation of the automatic CW point detector, protective clothing and decontaminants will begin [deleted]. In addition, a shipboard chemical collective protection system preliminary design prototype for the LHA class ships will be installed and evaluated [deleted]. Other improvements in clothing, masks, detectors, immunization, simulants, alarms and collective protection continue.

3. Medical Research.

This portion of the program would constitute about 15 percent of the FY 1983 effort.

Major deficiencies exist in medical protection from and for treatment of CW exposures. There is no satisfactory antidote against certain atropine-resistant anticholinesterase threat agents. Antidotes for such agents comprise an important part of national defense against CW.

PE 62734A Medical Defense Against Chemical Agents - This

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restructured program supports the entire medical XD effort for the Army (the Executive Agency for this mission), and as such, must address joint Service requirements. The research efforts of this program are concerned with the XD necessary to solve immediate and anticipated problems concerning the prevention, prophylaxis, treatment and management of CW casualties. This integrated program provides the critical basis for minimizing CW casualties, assuring their rapid return to duty, and thereby reducing the impact on combat resources. The FY 1983 program would continue safety and efficacy testing of candidate CW agent antidotes, prophylaxes and therapeutics. Development of mass CW casualty management procedures will be continued. Development of new materiel required to enhance CW casualty survivability and expeditious return to duty will be continued.

PE 63751A Medical Defense Against Chemical Warfare - This, a new start in FY 1982, represents the US Army Medical Department's current AD program for medical defense against chemical agents. The effort is to provide an effective medical system for maximizing safety and survivability of the soldier on the CW battlefield. Initial work will center on three areas: soldier chemical agent antidote development; patient decontamination; and medical management of CW casualties. During FY 1983, drug development efforts will be initiated and development of field rescusitative materiel will continue. In addition, new programs will be established for the toxicological assessment of decontamination materiel, and advanced development of a patient decontamination shower.

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4. Technical Support of Agent and Munitions Development. This portion of the program would constitute 11 percent of the FY 1983 effort. The programs included in this subgrouping support the DOD development of deterrent retaliatory and combat support chemical weapons.

PE 63615A Lethal Chemical Munitions Concepts - The objective of this Army program is to conduct AD on binary lethal chemical agent munitions which have advanced from XD and exhibit potential for casualty production through either the respiratory tract and/or penetration of environmental and protective clothing. Small-scale pilot units are designed and installed to obtain process engineering data for application to future production facilities. Chemical agent munition concepts that employ the binary principle are evaluated. No comparable work is done by the other services on lethal chemical agent processes. During FY 1983 the agent fill (intermediate volatility agent (IVA) versus more persistent lethal nerve agent) for the Multiple Launch Rocket System (MLRS) will be selected and the validation phase of the testing will be initiated. Munition fabrication for the 8-inch IVA projectile will be completed. Completion of AD of the chemical warhead for the MLRS is scheduled for FY 1985; FY 1983 for the 8-inch IVA projectile.

PE 64610A Lethal Chemical Munitions - The objective of this program is to conduct ED on new binary lethal chemical weapons and equipment for the Services. (The objectives of this program were changed in 1970 and currently support only the development of

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chemical munitions which produce the toxic agent via the binary mode.) The binary design would provide for maximum safety in handling, storage, transportation and demilitarization and at the same time optimize state-of-the-art advances to insure maximum effectiveness on-target. Development of the 155mm Binary Projectile (M687), which generates the non-persistent nerve agent GB-2, was completed during 1QFY 1977. ED of the 8-inch and MLRS Binary IVA projectile will continue in FY 1983.

PE 64604N CW Weapons (BIGEYE) - This program would provide for development of the BIGEYE, a binary spray bomb developed as a joint Service project with Navy as lead Service and Air Force as participating Service. Like the other binary systems, production is contingent upon a Presidential decision and Congressional funding. BIGEYE would be the first aircraft-delivered weapon to generate persistent agent (VX-2) from two non-lethal chemicals. Shipboard handling and storage would be permitted with this system whereas current chemical weapons are not normally authorized in peacetime aboard ship for safety reasons. The FY 1983 planned program completes most technical and operational tests and evaluations and initiates preparation of the Technical Data Package in readiness for a possible production decision. Development is to be completed [deleted].

Funds were requested and provided in the FY 1979 through 1982 budgets for maintenance of the existing inventory of CW munitions. The FY 1983 request contains $19.5 million for maintenance of chemical munitions.

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5. Field Test Activity.

This portion of the program would constitute about one percent of the FY 1983 effort.

PE 65804A DARCOM Ranges/Test Facilities - Dugway Proving Ground (DPG), Utah, is an installation of the US Army Test and Evaluation Command, a major subordinate command of the US Army Materiel Development and Readiness Command. DPG has a unique mission to plan, conduct, and report on tests that assess the military value of chemical weapons and defense systems and related procedures during and after exposure. No live agent weapon system testing has been conducted since 1969. DPG also conducts research, development, laboratory tests, field tests and investigations necessary to support the assigned mission, including meteorology, ecology, epidemiology and test technology. DPG operates under a uniform DOD reimbursement policy for major ranges and test facilities wherein users of these facilities pay all direct test costs and the facility itself finances the indirect costs of testing and the costs of operating and maintaining the facility. Scheduled major tests for FY 1983 includes the Jet Exhaust Decontamination/Smoke System. Other Service chemical-related studies will be conducted as requested.

B. Procurement.

The technical quality of much of US standardized and fielded CW warning and protective equipment represents the state-of-the-art. [Deleted]

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[deleted]. Procurement programs currently proposed by DOD for substantial quantities of standardized equipment would provide an improved protective posture enabling deployed forces to operate in a CW environment [deleted].

Significant increases were made to the FY 1979-81 programs to accelerate chemical protective equipment development and acquisition. There have been problems in reestablishing the production base for CW-related items. The major problem in the acquisition process is that the relatively small program quantities for certain equipment do not attract large industry interests, procurement regulations hamper rapid response, and the small manufacturers who receive contracts experience numerous problems in material supply and quality control.

The Army procurement program for the 16 divisions of its active force provided for achievement of an individual-protection capability [deleted] and will provide for replacement of equipment to be consumed by an increased annual training program and by shelf life losses in FY 1982-83. The Army is equipping its 8-division reserve components with priority to early deploying divisions.

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[Deleted] eight divisions are to be equipped by [deleted].

The Army has planned fairly substantial purchases of non-consumable items (alarms, shelters, etc.) for its 24-division total force. Most item purchases would be completed [deleted]. Equipment requirements for [deleted] war-reserve stocks have been identified and will be funded concurrently with initial issue requirements.

Air Force CW defense equipment procurement now provides a [deleted] capability for forces [deleted]. Designated mobility forces including Air Force Reserves and Air National Guard have received initial equipment stocks. Equipment includes: aircrew and ground crew, and special-team protective ensembles; detection and alarm devices; and decontamination equipment. [Deleted].

Chemical defense equipment is provided on all Navy ships. It consists of personal protective masks, impregnated clothing, water washdown systems to flush off contaminants, decontamination stations, medical antidotes and chemical agent detectors. This equipment is provided during the fitting-out period as a standard part of total costs. Organizational maintenance funds are pro-

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vided for subsequent repair and replacement, as required. Therefore, the Navy does not ordinarily differentiate between CW protective equipment and other items in its funding programs. Deficiencies remain in the areas of [deleted]. Actions are in progress to develop definitive plans and programs to equip Naval forces [deleted]. If shipboard evaluation is successful, the new Army/Air Force Chemical Agent Detection and Alarm Set (ionization point detector) or other candidate detector will be installed in Navy ships [deleted] as will be [deleted].

Marine Corps chemical procurement parallels US Army procurement because of the two Services' common interest in ground combat requirements. Since the US Army is the executive agent for joint Services chemical development, the Marine Corps closely monitors Army RDT&E activity to ensure that specific Marine Corps requirements are satisfied. Recently developed/improved chemical defense equipment, e.g., detectors/alarms, protective clothing, decontamination kits, and antidotes, have been programmed or are being processed for procurement [deleted]. The Marine Corps has programmed $104 million for procurement items during FY 1983 through FY 1987. Current developmental items satisfying Marine Corps requirements would be placed into the procurement cycle as soon as available for field use.

C. Integrated Binary Munition Production Facility.

The facility would be of modular construction -- designed

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for separate binary ingredient production and separate modules for the loading, assembling and packaging of both artillery projectiles and the larger items such as bombs or missile warheads. The initial module (155mm GB projectile), which has been authorized and funded by the Congress, includes basic utilities (power, water, waste treatment) and a portion of the security and safety equipment (fencing, lighting, intrusion alarms) for follow-on construction. Plans also exist for modules for the BIGEYE binary bomb and other follow-on systems. The present cost estimate for building the first two modules is [deleted]. A full binary program would result in the capability for an adequate stockpile of proper size, weapon and agent mix. The cost of such a modernization of the CW stockpile would be [deleted].

D. Disposal.

Disposal cost of the present stockpile, mainly because of environmental restrictions, will be a significant expense.

The Defense Science Board in its review of the Chemical Warfare Program in the summer of 1980, recognized the demilitarization problem as a national issue requiring significant resources. As a result, a "Long Range Chemical Demilitarization Concept Study" has been prepared and will be forwarded to the Congress per their request. It is estimated that 20 years and $2.7 billion would be required to demilitarize the current stockpile.

Of immediate concern to the Army is the requirement to dispose of sizeable quantities of obsolete toxic chemical agents and munitions being stored on Johnston Atoll in the Pacific and

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incapacitating agent BZ at Pine Bluff Arsenal, Arkansas. Construction of demilitarization facilities at both installations is programed for 1984.

FY 1983-1987 funds required for demilitarization are shown in Table 1:

TABLE 1: FY 1983-1987 Demilitarization Funds ($M).

	FY83	FY84	FY85	FY86	FY87	TOTAL
OMA	60.9	62.4	98.1	152.0	160.4	533.8
MCA	-	82.7[1]	-	53.6[2]	-	136.3[3]
R&D	12.8	13.9	10.0	7.6	-	44.3
Total	73.7	159.0	108.1	213.2	160.4	714.4

[1] Includes $9.1M MCA for BZ and $73.6M MCA for Johnston Island demilitarization facilities.

[2] Funds to be used to construct demilitarization facilities at four CONUS sites to expedite M55 rocket disposal.

[3] MCA dollars have been adjusted to reflect inflation.

In order to provide the improved technology necessary to demilitarize efficiently existing stockpiles of obsolete chemical munitions and agents, and eventually the entire current chemical stockpile, the Army initiated PE 63752A, Demilitarization Concepts, in FY 1982. The primary thrust of this program will be directed toward identifying alternative agent destruction technologies for application to chemical demilitar-

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ization process design. For FY 1983, detailed evaluation of alternative agent destruction processes will be completed. Pilot design will commence for those technologies offering the most benefit and least risk for incorporation into planned chemical demilitarization facility design. Prototype advanced munitions processing equipment will be evaluated. Prototype environmental monitoring systems will be designed and fabricated. Pilot-scale demilitarization waste disposal demonstrations will be initiated.

III. STATED MILITARY REQUIREMENTS

[Deleted]. US capabilities and commitments are presented in detail below.

A. US CW Objective.

The objective of the US CW program is to improve defensive and deterrent retaliatory capabilities against the use of chemical weapons while working to achieve a complete and verifiable ban on their production, development, and stockpiling. As part of a credible and effective deterrent, the US seeks to achieve an adequate CW warning and protective capability and the ability and means to retaliate with chemical weapons in such a manner as to neutralize

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the advantages gained by enemy use of CW and to seek termination of the use of chemical weapons at the lowest level possible.

Recent DOD assessments, as well as those of past years, have found [deleted] weaknesses in the US CW posture, considering the continued Soviet emphasis on CW [deleted].

B. Soviet and Warsaw Pact CW Capabilities.

A large asymmetry exists between the US and USSR in chemical weapon capabilities. Soviet military doctrine includes the use of chemical weapons. Of more significance, the Soviet forces are the best prepared and equipped in the world to operate in a CW environment produced either by an enemy or themselves. The Soviets have operational chemical weapon stocks, [deleted]. They also have a wide range of weapon systems capable of delivering chemical agents. The Soviets have devoted more resources than the US to Chemical/ Biological/Radiological (CBR) defense/protection, reflecting concern for the ability of their forces to operate in a CW environment. For example, new equipment fielded by Soviet forces (new armored personnel carriers, tanks, reconnaissance vehicles, some trucks, and various types of support equipment) is provided with modern filtration and protective systems. Some of the non-Soviet Warsaw Pact forces have produced and acquired similar equipment. CBR training for WP forces is extensive and frequent. [Deleted]

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[deleted]. These measures enable these forces to operate in a CW environment more effectively than US/NATO forces.

Based on the analysis of all available evidence, [deleted]. Since 1976, there have been numerous reports on CW use in Southeast Asia. These include information on probable Soviet-sponsored use of chemical agents in Laos and Kampuchea indicating that several agents had been used and that as many as several thousand people may have died. [Deleted]. Analysis of data from Afghanistan indicates use of riot-control agents, incapacitants, and lethal agents by Soviet forces. Recent analysis and intelligence indicates good evidence of mycotoxin use in Kampuchea and Laos. [Deleted]. Overall, evidence on the role of the Soviets [deleted]. Although these conflicts present situations different from what could be expected

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in a war in Europe, the available evidence suggests that chemical warfare remains an intrinsic part of Soviet military strategy.

C. Impact of CW Use on US Forces.

Chemical attacks would seriously degrade all aspects of tactical combat operations [deleted]. Logistic and host nation support provided to the battlefield commander would be drastically reduced in a contaminated environment. [Deleted]. Even when protective measures are adopted to save lives, degradation in the performance of the military mission caused by these measures can be as high as [deleted].

The effect would be doubly severe, if NATO forces alone were subject to this attack without the enemy being equally impeded by chemical attack on his first and second echelons and supporting force structure. The need to deter the use of chemical warfare in any conflict is critical.

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D. CW Protective Program.

CW protective capabilities are necessary to ensure that conventional and theater nuclear forces can survive and operate in a chemical environment. The existence of a credible Soviet CW program dictates that the present US RDT&E protective program be continued to allow for the development of an effective protective posture. A protective capability also requires highly trained, properly equipped and motivated forces and is needed regardless of whether or not we have a retaliatory capebility.

E. In-Kind Retaliation.

An in-kind retaliation capability is viewed by many as the most credible and effective specific deterrent presently obtainable against Soviet use of chemical weapons. Chemical weapons used in a retaliatory role are an effective non-nuclear counteraction that could offset most of the advantages an enemy might expect to gain by CW offensive actions and places his forces in the same degraded posture as the defender. Defense/protective measures alone cannot constitute a credible deterrent given the operational degradation that accompanies their use and the fact that protective measures, even if available, are frequently degraded by normal combat conditions. In NATO Europe, the threat of retaliation in-kind is consistent with the direct defense option of the strategy of flexible response. A threatened retaliatory use of chemical weapons might be more credible and less escalatory than a threat to use nuclear weapons, as well as providing sufficient time for political and diplomatic efforts to

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terminate the conflict prior to crossing the nuclear threshold.

The allies have committed themselves to improving their protective capabilities under the Long-Term Defense Plan. [Deleted].

1. Present US CW Retaliatory Capabilities.

There has been an increasing [deleted]. The policy requires that US forces possess a credible and effective CW retaliatory capability if deterrence fails. [Deleted].

As previously reported, current US inventories of ready-to-issue and repairable lethal chemical munitions [deleted].

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* Repairable munitions are unserviceable munitions which can be brought to serviceable condition by various maintenance operations such as replacing unserviceable explosive components, inserting explosive components, de-rusting, remarking of containers, repackaging, etc. During the conduct of these operations, which includes an inspection of each round, some munitions will be found to be unrepairable. "Ready-for-issue" munitions are those in serviceable condition with all explosive components (bursters and supplementary charges) uploaded.

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[Deleted].

The current maintenance plan primarily places emphasis on [deleted].

As weapon systems are phased out, or become obsolete as a result of changes in tactics and doctrine, munitions for these systems [deleted] will be placed in a category awaiting demilitarization. In the interim, as long as applicable delivery systems are in the inventory, and these munitions are safe to use, they should be maintained in order to optimize the effectiveness of the current deterrent retaliatory stockpile. Thus, for these reasons, by the late 1980s, [deleted] of the present [deleted] will remain in ready for issue and repair-

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able lethal chemical munitions. [Deleted].

2. Stockpile Improvements.

Although funds have been provided for the construction and equipping of the Phase 1 binary chemical munitions facility, no authority has been granted relative to production of binary chemical munitions. The construction is being undertaken now to ensure that a facility will be available should a production decision be made.

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IV. FUNDING * ("then year" $ in millions)**

Development $		FY 81	FY 82	FY 83	FY 84 (est.)	FY 85 to Completion	Total Dev.	Total Proc.	Total Units	Unit Cost	Total Program Cost
Technical Base											
61102A Def Rsch Sciences A 71A		2.4	6.4	5.1	3.0	Cont	NA	NA	NA	NA	NA -
62622A Cml Mun & Cml Cmbt Spt		7.3	10.5	9.0	11.0	Cont	NA	NA	NA	NA	NA
62706A CB Def & Gen Invest		13.2	22.9	29.6	40.3	Cont	NA	NA	NA	NA	NA
62764M C/B Def Tech		0.7	1.0	1.0	2.5	Cont	NA	NA	NA	NA	NA
	SUBTOTAL	23.6	40.8	44.3	56.8						
Defense Materiel											
63721A Cml Def Mat Concepts		17.4	20.0	26.5	20.0	Cont	NA	NA	NA	NA	NA
63745F CW Def		-	4.0	4.9	4.7	Cont					
64725A Cml Def Mat		17.4	37.7	26.0	45.3	Cont	NA	NA	NA	NA	NA
64506N BW/CW Countermeasures		3.7	7.7	0.4	0.4	Cont	NA	NA	NA	NA	NA
64601F C/B Def Equip		0.9	0.8	16.3	16.3	Cont	NA	NA	NA	NA	NA
	SUBTOTAL	47.4	70.2	82.1	103.5						
Medical Research											
62734A Med Def against Cml Agts		14.4	25.0	26.9	37.1	Cont	NA	NA	NA	NA	NA
63751A Med Def against CW Warfare		-	-	2.9	39.6	Cont	NA	NA	NA	NA	NA
	SUBTOTAL	14.4	25.0	29.8	76.7						
Agent and Munitions Develop											
63615A Lethal Cml Mun Concepts		0.1	0.2	13.7	20.4	Cont	NA	NA	NA	NA	NA
64610A Lethal Cml Mun		-	2.2	-	3.6	Cont	NA	NA	NA	NA	NA
64604N CW Weapons		-	7.5	8.0	3.5	Cont	NA	NA	NA	NA	NA
	SUBTOTAL	0.1	17.9	21.7	27.5						
Field Test Activities											
65718A Joint Test		0.7	1.4	1.4	2.2	Cont	NA	NA	NA	NA	NA
Demilitarization											
63752A Demil Concepts		-	9.5	12.0	13.0	Cont	NA	NA	NA	NA	NA
Total Development		86.2	182.4	194.1	290.1						
Procurement - Chemical Defense***		125.1	307.4	404.0	632.0	Cont	NA	NA	NA	NA	NA
Stockpile Maintenance		4.1	5.3	19.5	16.4	Cont	NA	NA	NA	NA	NA

* Includes only CW funding wherever programs include BW or other activities.
** Department of Defense
*** Includes operation and maintenance, military construction, and war reserve.

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V. ANALYSIS

The proposed FY 1983 CW Program (i.e., active RDT&E of both deterrent retaliatory and defensive CW programs, procurement of an improved protective CW capability, initiation of actions needed to modernize the US deterrent retaliatory capability and to dispose of the deteriorating chemical agent stockpile, and maintenance of chemical munitions) provides the basis for this analysis.

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The US CW program is consistent with US arms control policy. The US is committed to the eventual objective of a complete and verifiable prohibition of all chemical weapons. Specific arms control options in CW are being reviewed as part of the Administration's overall examination of international security issues. However, in the absence of satisfactory international agreements to eliminate the threat of CW, [deleted]. Congressional and Administration actions to construct and to equip Phase 1 of a binary CW production facility do not represent a decision to place greater emphasis upon chemical warfare but reflect overall US national security policy -- the deterrence of war. They represent a necessary step to increase the effectiveness of the US policy of providing a credible and effective deterrent retaliatory capability, and so that the US can gain negotiating leverage in the area of CW arms control. These actions are fully consistent with, and complementary to, the pursuit of an eventual comprehensive and verifiable ban on chemical weapons and the US policy of no first use of chemical weapons.

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B. Relation to Arms Control Agreements.

The US is not constrained by international law nor party to any treaty or other legal obligation that would inhibit the development, production, stockpiling or deployment of chemical weapons.

The Geneva Protocol of 1925, to which the United States acceded in 1975, in effect, prohibits the first use in war of asphyxiating, poisonous, or other gases, and of bacteriological methods of warfare,* because some signatories, including the US and USSR, reserved the right to retaliate in-kind after first use by another signatory. The Protocol does not prohibit development, stockpiling or production of chemical weapons.

While the US is legally bound not to use chemical weapons first in war, the US maintains a chemical weapons capability for deterrence and for retaliatory purposes. The conduct of research in retaliatory-related CW areas and the initiation of actions needed to improve the deterrent retaliatory stockpile provides a base for reestablishing the credibility and effectiveness of the US CW deterrent retaliatory capability. In addition, this retaliatory

* The United States has consistently interpreted the Geneva Protocol as applying to lethal or incapacitating chemical agents, and not to riot control agents. The majority of states party to the Protocol make no such distinction, and consider the first use of riot control agents in war to be covered by the prohibition in the Geneva Protocol. In seeking Senate advice and consent to ratification of the Protocol, the President declared that, as a matter of policy, the US would not be the first to use riot control agents in war, except in defensive modes to save lives, subject to Presidential approval.

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related CW research also provides a base for the prevention of technological surprise and allows evaluation of the vulnerability of US forces and equipment and improves the CW arms control negotiating position of the United States.

Efforts to improve CW protection capabilities are not constrained by any treaty or other legal obligation.

C. Effect on Current and Prospective Negotiations.

The proposed FY 1983 US CW program described in Section II of this ACIS is consistent with US participation in efforts to attain a complete, effective and verifiable chemical weapons agreement.

The US approach to CW arms control has been to seek a comprehensive prohibition on the production, stockpiling, acquisition or retention of CW agents and munitions. Development of CW agents or munitions would be prohibited, but development of means of protection against chemical attack would be permitted. Existing stocks of CW agents and munitions would be destroyed over a period of ten years. All facilities designed or used for production of prohibited chemicals would be declared and immediately closed down and subsequently destroyed. However, under appropriate controls such a facility could be used for agent/munition destruction operations. The disposition of declared facilities and the destruction of declared stocks would require on-site verification under independent, international auspices. Although full implementation of such a ban could take at least ten years after coming into force (time required for destruction of stocks), in the long term an adequately

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verifiable CW agreement might eliminate significant risk to US/NATO forces posed by Soviet CW capabilities and prevent further proliferation of chemical weapons.

Our allies support efforts toward attainment of a complete, effective and verifiable chemical weapons agreement.

Bilateral US-USSR negotiations on a comprehensive chemical weapon prohibition began in 1977 and stalled in 1979 over verification issues. No bilateral negotiations have been held since 1980.

In multilateral fora, discussions on a chemical weapon agreement have been underway since the late 1960s. With the beginning of US-USSR negotiations, multilateral activity waned to some extent, although interest in a CW prohibition on the part of our allies and others continued.

Over the last two or three years, multilateral interest in CW discussions has intensified. During its spring 1980 session, the Committee on Disarmament (CD) established an ad hoc working group whose mandate was limited to identifying the issues which would have to be discussed in the negotiating of an eventual CW prohibition and to obtaining states' views on these issues, and did not permit negotiation of treaty language. The Working Group's mandate was renewed for the 1981 session. [Deleted].

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[Deleted].

[Deleted].

[Deleted].

[Deleted]

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[deleted].

The Administration [deleted].

[Deleted].

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We must also note that a US decision [deleted].

D. <u>Effect on Global and Regional Stability</u>.

The United States believes that CW capabilities play an important role in deterrence and defense. NATO's strategy of flexible response requires a variety of options in support of military and diplomatic efforts to bring a conflict to early termination on terms acceptable to the United States and its allies. Continued retaliatory RDT&E efforts and initiation of actions needed to improve the US deterrent retaliatory capability, to procure an improved protective capability and to gain leverage in arms control negotiations, should contribute to stability. Continued reliance on the existing [deleted] stockpile could, however, encourage instability by increasing the interest of other countries to acquire and employ chemical weapons.

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[Deleted].

[Deleted].

E. Technological Implications.

[Deleted].

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[Deleted].

F. Potential Interaction with Other Programs.

Chemical weapons are important to deterrence as a link between conventional capabilities and theater nuclear weapons. In the current environment of [deleted].

[Deleted] the capabilities of conventional forces and chemical retaliatory capabilities will be significant determinants of the nuclear threshold. For this reason, NATO has emphasized flexible response to preclude the necessity of nuclear weapons use for war fighting.

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G. Verification.

The Soviet Union can verify easily that the US is actually conducting the CW program which we openly claim, i.e., active RDT&E of both retaliatory and defensive CW programs, initial construction of a binary production facility, and procurement of an improved protective CW capability. [Deleted].

[Deleted].

For the above reasons, [deleted]

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[deleted].

Efforts under way [deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Elimination of the use of chemical weapons is a national security objective of the United States. The use of mycotoxins and CW in SEA and Afghanistan underscores the importance of this objective. US policies to achieve this objective have two interrelated and complementary aspects. The first deals with chemical weapons arms control and disarmament, the second with military strategies and capabilities to deter and, if necessary, defend against chemical warfare. Essentially, chemical weapons arms control is to be pursued, and appropriate military capabilities are to be maintained, until such time as effective international agreements remove existing and future threats of chemical warfare.

[Deleted]. Active RDT&E of both deterrent retaliatory and defensive CW programs, procurement of an improved CW protective capability and the initiation

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of actions needed to modernize the [deleted] CW deterrent retaliatory capability are necessary for deterrence of Soviet use of CW and for our defense. They are consistent with US arms control policy and, by helping to eliminate the existing large asymmetry in US-USSR CW capabilities, will improve the US CW negotiating leverage by providing increased incentive for the Soviets [deleted].

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DIRECTED ENERGY PROGRAMS

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
63605F	Advanced Radiation Technology
62601F	Advanced Weapons: Laser Applications and Particle Beam Technology
64406F	[Deleted] Project 2135
63603F	Space Laser Program
62735N	High Energy Laser Technology
62768N	Directed Energy Technology
62307A	Laser Weapon Technology
63314A	High Energy Laser Components
62711E	Experimental Evaluation of Major Innovative Technologies: Projects EE-7, EE-8, and EE-12
62301E	Strategic Technology/Project ST-3, HEL Technology
62707E*	Particle Beam Technology

* This program now includes research previously sponsored by the US Army under PE #63304A, "BMD Advanced Technology Program: Particle Beams," and by the Defense Advanced Research Projects Agency under PE #61101E, "Defense Research Sciences: Particle Beams."

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The above programs represent an effort to explore and, if feasibility is proven, to develop the potential of directed energy (DE) weapons.

Extensive studies have shown that, if actually developed, DE weapons would have potential mission advantages over many existing types of weapons against missiles, aircraft and spacecraft targets. Such advantages flow mainly from the extremely high delivery speed of the damaging energy to the targets. This permits little opportunity for evasive maneuver by the target and thus the use of multi-shot and rapid retargeting capabilities against saturation attacks.

While high energy lasers and particle beams differ in state of development and in the technology required to realize them, they have potential for weapon systems of similar operational characteristics. Moreover, if they can be developed as weapons, they could have similar implications for the future of the Anti-Ballistic Missile (ABM) Treaty, possible anti-satellite (ASAT) negotiations, and space defense issues generally.

II. PROGRAM DESCRIPTIONS

A. The DOD High Energy Laser Program.

The DOD high energy laser (HEL) program is an integrated effort of the Services and the Defense Advanced Research Projects Agency (DARPA). Its purpose is to continue developing the technology for laser devices (beam generators), pointing and tracking (beam control) and fire control systems, and to demonstrate the feasibility and potential of high energy lasers as weapons. The program is

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structured to demonstrate, by the mid-1980s, whether work on advanced development prototypes should begin. If such protoypes are demonstrated as feasible by the early 1990s, laser weapons could be available in the late 1990s for selected offensive and defensive applications such as defense of ships, aircraft, high value ground targets or satellites, destruction of ground and airborne sensor systems, and ballistic missile defense. The following paragraphs (B. through K.) discuss the programs of the individual Services and DARPA.

B. Program Element #63605F - Advanced Radiation Technology.

1. Capabilities. The goals for the Air Force program are to demonstrate [deleted]. Major on-going efforts include:

a. Airborne Laser Laboratory I (ALL-I).

The ALL-I, a specially equipped transport aircraft (NKC-135), has been designed to carry HEL equipment [deleted] from an airborne platform. The design includes a [deleted] gas dynamic laser [deleted]. This test bed began in FY 1981 to be used in experiments [deleted]

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[deleted]. Later, a radar acquisition and firing system that is being developed may be added, and the ALL-I would be used in experiments [deleted].

b. Airborne Laser Laboratory II (ALL-II).

The ALL-II program is separate and distinct from the ALL-I. It would use a large jet aircraft and demonstrate HEL weapons [deleted].

c. Short Range Technology (SRT) Program.

The SRT program is structured to evaluate the potential of near-term laser technology, [deleted].

d. Intermediate Range Technology (IRT) Development Program.

This program is concentrated on the critical technology [deleted] applications, [deleted]. Included are the development of: [deleted]

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* A microradian is an angular measure which spans one centimeter at ten kilometers distance. It is approximately one-fifth of an arc second.

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[deleted].

e. Mid Range Applied Technology (MRAT).

The objective of this program is to demonstrate the [deleted]. The program would include advanced beam control technology development and an integrated laser system demonstration. [Deleted].

f. Advanced Development/Support (AD/S).

Development of advanced concepts in adaptive optics, laser devices, beam control, and optical components would be pursued under this effort.

2. Program Status. The status of the above programs is as follows:

a. ALL-I.

[Deleted] testing of the ALL-I system in flight [deleted].

b. ALL-II.

[Deleted]

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[deleted].

c. SRT.

Development of [deleted].

d. IRT

[Deleted].

e. MRAT.

Design, procurement and technology development activities would continue [deleted].

f. AD/S.

The development and expansion of the technology base for high energy lasers is being pursued with increasing emphasis on [deleted] advanced [deleted].

C. Program Element #62601F - Advanced Weapons: Laser Applications.

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1. Capabilities. This program explores the technical feasibility and operational practicality of lasers as weapons to fulfill specific USAF mission requirements. Studies are performed to include advanced laser device concepts, advanced [deleted] investigation of high energy laser effects, and studies and analysis of potential applications of high energy laser systems.

2. Program Status. [Deleted].

D. Program Element #64406F - [Deleted] Project 2135.

1. Capabilities. This program supports research related to the use of high energy lasers [deleted]. Systems definitions are prepared such that should the technology mature sufficiently, the Air Force will be in a position to proceed with a full-scale development.

2. Program Status. The May 13, 1981 Secretary of Defense cover letter transmitting the Report to the Congress on Space Laser Weapons recommends that DOD's current $100 million per year in space laser development be augmented to the extent of approximately $50 million per year starting in FY 1982. A new program element, PE #63603F, has been established and all space-

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based laser activity conducted under Project 2135 is being transferred to this new program.

E. Program Element #63603F - Space Laser Program.

1. Capabilities. The new Air Force Space Laser Program is designed [deleted]. The new program will:

a. [Deleted].

b. Develop detailed concept definitions for the more promising laser weapon options. Investigate technological and operational aspects with [deleted].

c. Establish realistic bounds on space-based laser weapon lethality in various possible applications.

d. [Deleted].

e. Reduce uncertainties in basic laser system technology, [deleted] and cost and schedule estimates.

f. [Deleted].

2. Program Status. Air Force planning activities are underway. In FY 1983, concept definition efforts, lethality assessments and space laser technology programs will be initiated. A joint DARPA/AF program plan is being prepared.

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F. Program Element #62735N - High Energy Laser Technology.

1. Capabilities. The objective of this program [deleted] is to demonstrate the utility of the HEL in a number of potential naval applications [deleted]. This would be achieved by developing and integrating the necessary components in a test bed to demonstrate that the subsystems work effectively together. This integrated test bed would then be used [deleted] at White Sands Missile Range using targets and scenarios that are appropriate to all Services' needs. The subsystems under development include the laser [deleted] an optical pointer/tracker, and an automatic aimpoint selection and maintenance subsystem.

2. Program Status. The MIRACL completed acceptance testing in FY 1981. During FY 1982 and FY 1983, this [deleted].

G. Program Element #62768N - Directed Energy Technology.

1. Capabilities. This program is designed to

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support research on advanced directed energy technologies and on system concepts for a variety of military applications.

2. Program Status. For FY 1983, this program would support research in HEL (including [deleted] charged particle beams, high power microwaves, and [deleted] technology. Experimental tests would begin using [deleted]. High power microwave developments would include further work on devices and on experiments and theory related to atmospheric breakdown. Also, research would be conducted on the key components of directed energy technologies, e.g., [deleted].

H. Program Element #62307A - Laser Weapon Technology.

1. Capabilities. This program explores potential HEL uses in weapon systems for a variety of Army mission applications, and advances the HEL technology base. Potential applications being pursued are [deleted]. The technology base advancement entails research in laser science and quantum physics.

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2. Program Status. [Deleted].

I. Program Element #63314A - High Energy Laser Components.

1. Capabilities. This program element funds two feasibility demonstrations beginning in FY 1983 for potential HEL uses in weapon systems for a variety of Army mission applications.

2. Program Status. [Deleted].

J. Program Element #62711E - Experimental Evaluation of Major Innovative Technologies: Projects EE-7, EE-8, and EE-12.

1. Capabilities. The listed projects are [deleted] to demonstrate key elements of [deleted] a [deleted] laser [deleted] system. [Deleted]

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[deleted].

a. <u>[Deleted] Project EE-8)</u>. [Deleted].

b. <u>[Deleted] Project EE-12)</u>. [Deleted].

c. <u>[Deleted] Project EE-7)</u>. The objective of this program is to develop and test [deleted]

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[deleted].

2. Program Status. For FY 1983, the planned activities for each of the projects is as follows:

a. [Deleted].

b. [Deleted].

c. [Deleted].

K. Program Element #62301E - Strategic Technology/Project ST-3, HEL Technology.

1. Capabilities. [Deleted] applications are the focus of the DARPA efforts in the DOD HEL program. [Deleted]

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[deleted].

2. Program Status.

[Deleted].

[Deleted]

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[deleted].

L. The DOD Particle Beam (PB) Program.

Weapons based on particle beams of high currents and high energies could, if feasibility is demonstrated, serve as a possible alternative or supplement to other weapon systems. Also, particle beams will continue to have many non-weapon applications (e.g., radiography and fusion research) and can be used in research on nuclear weapons effects.

Depending on the applications intended, there are various functions which must be performed by each component of any given PB weapon system, and each of these functions represents technology which is pushing the current state-of-the-art. Typically, these functions (components or problem areas) include: (1) primary power systems; (2) short-term energy storage; (3) accelerator injectors (or sources of particles); (4) pulse forming networks; (5) pulse power switches; (6) materials (primarily insulators and magnetic materials); (7) accelerator beam dynamics internal to the accelerator structure (including accelerating systems, such as induction and radio frequency accelerator systems); (8) beam

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conditioning and aiming; (9) propagating beam dynamics external to the accelerator structure; (10) beam-target interaction; and (11) propagating-beam sensing. For several of these areas -- particularly external propagation, beam conditioning and beam dynamics -- there are critical questions regarding scientific feasibility.

In FY 1978, the DOD sponsored a study to review particle beam technology and to develop a program to determine its technical feasibility for possible military applications. The study group recommended several options for resolving the uncertainties associated with the relevant technology areas discussed above. Some of the recommendations have been accepted [deleted].

The possible applications for PB weapons include: [deleted]. The following paragraphs (Section M) discuss the more significant research efforts underway to accomplish those missions.

M. Program Element #62707E - Particle Beam Technology.

1. Capabilities. The principal effort in cost terms in PB weapon research is the DARPA funded program, which is designed to demonstrate [deleted]

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[deleted].

Another particle beam effort under this program was transferred from Army to DARPA sponsorship for FY 1981 and following years. [Deleted].

2. Program Status. For FY 1983, the major technical effort would be [deleted].

Another important effort under this program is called "pulsed power technology." This technology is critical for charged PB weapons and may be critical for certain laser weapon devices. Pulsed power technology involves a source of electrical energy, a storage mechanism, a means for switching the energy to a load, and some means of shaping and conditioning the pulse. [Deleted].

Feasibility experiments [deleted]

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[deleted].

III. STATED MILITARY REQUIREMENTS

Directed energy weapons could provide US military forces with improved means [deleted].

The Soviets are clearly interested in areas of advanced technology which hold promise of capabilities beyond those possessed by currently deployed [deleted]

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systems. [Deleted].

[Deleted]

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[deleted].

[Deleted].

The US scientific community believes that the stringent requirements of PB weapons render the developmental problems particularly acute. For example, US uncertainties in the understanding of [deleted].

[Deleted]

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[deleted].

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IV. FUNDING ("then year" $ in millions)*

	FY 81 & Prior	FY 82	FY 83 (est)	FY 84 (est)	FY 85 to Completion	Total Dev.
Advanced Radiation Technology (#63605F)	613.3	75.5	95.1	[deleted]	[deleted]	NA
Advanced Weapons: Laser Applications (#62601F)	98.4	12.8	13.8	[deleted]	[*eleted]	NA
[Deleted] Project 2135 (#64406F)	3.6	20.5	0.7	[deleted]	[deleted	.NA
Space Laser Program (#63603F)	0	0	40.6	[deleted]	[deleted]	NA
High Energy Laser Technology (#62735N)	357.8**	57.5	63.2	[deleted]	[deleted]	NA
Directed Energy Technology (#62768N)	NA	6.0	14.9	[deleted]	[deleted]	NA
Laser Weapon Technology (#62307A)	20.8	22.9	31.3	[deleted]	[deleted]	NA
High Energy Laser Components (#63314A)	189.3	0	33.1	[deleted]	[deleted]	NA
Strategic Technology/Project ST-3, HEL Technology (#62301E)	303.5	38.6	39.4	[*-leted]	[deleted]	NA
Experimental Evaluation of Major Innovative Technologies: EE-7, EE-8 & EE-12 (#62711E)	92.5	61.5	71.0	[deleted]	[deleted]	NA
Particle Beam Technology (#62707E)	68.7***	32.5	31.0	[deleted]	[deleted]	NA

* Development dollars only. [Deleted].
** Previously funded under P.E. #63754N and P.E. #63587N.
*** Previously funded under P.E. #61101E.

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The paramount aim of US arms control policy is to reduce the risk of war. In pursuing this aim, the United States seeks arms control agreements that are genuinely stabilizing, equitable, and verifiable. DOD's research related to possible DE weapons is consistent with this approach. For example, one research focus is to demonstrate the technological feasibility of a [deleted]. Improved capabilities in this role could enhance deterrence and add stability to the perceived balance of tactical forces.

Research is also conducted to stay abreast of technologies having military potential and to gain insight into what the Soviets and others may be discovering through their own research. This activity also helps provide confidence that the US can maintain an adequate balance of forces.

DE weapons could have [deleted] these programs are reviewed for their consistency with, and potential impact on, the US policy of strategic arms control. The impact of these weapons on strategic stability is discussed below.

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B. Relation to Arms Control Agreements.

[Deleted] the current DE research programs are not constrained by existing arms control agreements. The BMD potential of future DE weapons could eventually create a conflict with the obligations assumed by the US under the provisions of the ABM Treaty.

The ABM Treaty bans the development,* testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. In addition, although the Treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams) and including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the Treaty prohibits the deployment of such fixed, land-based systems and components unless the Parties consult and amend the Treaty.

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* The US interpretation of the term "development," as used in the ABM Treaty, is as follows:

> "The obligation not to develop such systems, devices or warheads would be applicable only to that stage of development which follows laboratory development and testing. The prohibitions on development contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or bread-board model." (As provided by Ambassador Gerard Smith to the Senate Armed Services Committee during its hearings concerning ratification of the ABM Treaty. For more complete discussion see Senate Armed Services Committee, Hearing on the Military Implications of the Treaty on the Limitations of Anti-Ballistic Missile Systems and the Interim Agreement on Limitation of Strategic Offensive Arms, 92nd Congress, 2nd Session, July 18, 1972, p. 377.)

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The ABM Treaty prohibition [deleted] applies to directed energy technology (or any other technology) used for this purpose. Thus, when such DE programs enter the field testing phase they become constrained by these ABM Treaty obligations.

With regard to DE systems in an ASAT role, only the actual use of systems to interfere with national technical means (NTM)* used to verify compliance with strategic arms control agreements -- as opposed to development, testing, or deployment of systems that could be used in such roles -- is prohibited under the provisions of the ABM Treaty (Article XII) and the SALT I Interim Agreement (Article V) and Article XV of the unratified SALT II Agreement. (Pending the completion of the internal review of US SALT policy, the US has announced that it will not undertake any action that would undermine existing agreements, as long as the USSR continues to do likewise.)

Existing treaties and agreements impose certain additional restraints on ASAT activities. For example, Article IX of the Outer Space Treaty requires international consultations prior to any planned activity or experiment, if the sponsor of such activity or experiment has reason to believe it would cause potentially harmful interference witht the peaceful space activities of others. Also, Article III of the Outer Space Treaty constrains the use of

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* NTMs are not defined in any international agreement.

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outer space to activities which are "in the interest of maintaining international peace and security and promoting international co-operation and understanding." Other international agreements extend specific protections to certain classes of satellites. Under the Direct Communications Link Improvement Agreement, the US and the USSR each "confirms its intention to take all possible measures to assure the continuous and reliable operation" of the emergency satellite system; and, under the International Telecommunication Convention, both are obligated to avoid "harmful interference to the radio services or communications" of other parties.

None of these agreements would affect the development of [deleted] systems as long as the testing of such systems did not result in prohibited interference [deleted].

C. Effect on Current and Prospective Negotiations.

Current DOD directed energy programs are consistent with present US positions in arms control negotiations.

The Soviets and the US have, in the past, addressed possible limits on anti-satellite systems, [deleted]. Currently the US is reviewing its policy in this area. [Deleted].

Considering the lack of significant near-term development of US or foreign PB weapons for ASAT (or other military missions), it is unlikely that PB weapon questions -- as distinct

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from HEL weapon questions -- would impact on current and prospective negotiations in the near-term.

The Soviets, in public and in the Committee on Disarmament Working Group on Radiological Weapons and New Mass Destruction Weapons (MDW), have raised the issue of particle beams produced by accelerators as possibly leading to MDW. They have drafted a proposal on MDW which would, inter alia, ban development and manufacture of weapons using "charged and neutral particles to affect biological targets." [Deleted]. Instead, the US has participated, with the Committee on Disarmament, in a continuing review of the potential for development of such weapons. The objective is to frame specific preventive measures when and if necessary. In any case, most PB weapons, as currently conceived, would not be classified as MDW since they are by nature point weapons. [Deleted].

D. Effect on Global and Regional Stability.

[Deleted] no effect, destabilizing or stabilizing, on a global or regional scale is anticipated in the foreseeable future. [Deleted]

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[deleted] the near-term impact of this action on other nations would be expected to be slight, with little or no effect on stability.

New technologies like HEL weapons could serve arms control interests by encouraging nations to negotiate with one another in an attempt to avoid waging and possibly losing an expensive weapons race. It is not possible at this time to make a reasonable assessment of the net impact of the HEL program on future global or regional stability. [Deleted].

E. Technological Implications.

There is little doubt that directed energy weapon development is an area of military technology with high priority and potentially great importance to both the US and USSR. In addition, as prototype HEL weapon systems become visible, other technologically advanced countries may be attracted to this new area of arms technology, though the cost could be a serious restraint. Interest may increase and diffusion of knowledge is likely to take place [deleted].

If laser weapons do begin to make a difference in military calculations, then their deployment will inspire adversaries to develop countermeasures and/or to increase the numbers of offen-

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sive weapons in order to cope with the improved defensive capability of laser systems.

The US PB R&D program is not apt to have significant near-term technological impact since its scale is relatively small compared to HEL technology and to related non-weapon technology. Active pursuit of the basic non-military technology is useful in preventing technological surprise.

F. Potential Interaction with Other Programs.

As described earlier, the successful development of DE weapons offers [deleted]. Deployment of a [deleted] system based on directed energy technology would have significant effect on many defense programs.* For example, [deleted].

* [Deleted].

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[Deleted].

G. Verification.

The status of research and development in the technologies associated with DE weapons has two basic intelligence aspects. [Deleted]

[Deleted]

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[deleted].

In the past, our ability to assess the [deleted].

[Deleted]

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[deleted].

[Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The high energy laser and particle beam concepts represent new technologies with potential weapon applications. [Deleted].

[Deleted]

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[deleted].

[Deleted].

The ABM potential of DE weapons has arms control implications because the 1972 ABM Treaty bans the development, testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. In addition, although the Treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams), including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the Treaty

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prohibits the deployment of such fixed, land-based systems and components unless the Parties consult and amend the Treaty.

The potential of ABM and ASAT applications, as discussed above, provides the only apparent arms control impacts which are associated with the development of DE weapon technologies.

Possible limits on anti-satellite systems have been addressed by the US and the Soviets. The US position on ASAT negotiations is being reviewed.

[Deleted].

[Deleted] though the DE-related R&D efforts funded in this FY

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1983 budget have no more than marginal arms control effects now, this technology deserves continuing attention in the future.

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PART II: ABBREVIATED ARMS CONTROL IMPACT STATEMENT

DEPARTMENT OF DEFENSE PROGRAMS

SECTION I - Previously Submitted ACIS.

The following Arms Control Impact Statements, which have continuing arms control implications, have had no significant changes in funding, program direction, policy, or international developments that would revise the Administration's analysis forwarded early in 1981. The need for updated ACIS will be reevaluated as these programs evolve.

<u>Anti-Ship Missile Systems</u>

PE 63530N	Over-The-Horizon Targeting
Procurement	AGM/RGM/UGM-84A HARPOON

<u>Large Area Ocean Surveillance Systems</u>

PE 24311N	Undersea Surveillance Systems
PE 24313N	Surveillance Towed Array Sensor
PE 62711N	Undersea Target Surveillance
PE 64789N	Surveillance Towed Array Sensor
PE 62702E	Tactical Technology (Ocean Monitoring and Control)
Procurement	T-AGOS
Procurement	SURTASS
Procurement	SOSUS
Procurement	T-ARC

<u>Strategic Warning and Attack Assessment</u>

PE 12431F	Defense Support Program and Associated Procurement
PE 12423F	Ballistic Missile Early Warning System and BMEWS (474L) Modification Procurement
PE 31357F	Integrated Operations Nudets Detection System (IONDS)
PE 12417F & PE 63703F	CONUS-Over-the-Horizon Radar System
PE 63424F	Missile Surveillance Technology
PE 63425F	Advanced Warning System
PE 12325F	Joint Surveillance System
PE 12411F	Surveillance Radar Stations/Sites

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Advanced Isotope Separation and Centrifuge Enrichment

(1 program)

NAVSTAR Global Positioning System

PE 64778F	NAVSTAR GPS (Air Force)
PE 64778N	NAVSTAR GPS (Navy)
PE 64778A	NAVSTAR GPS (Army)
PE 63401N	NAVSAT Timing & Ranging (NAVSTAR GPS) (Navy)

SECTION II - Other Programs Which Meet Congressional Criteria for Arms Control Impact Statements.

The activities within the programs listed below are primarily associated with one or more of the following:

-- Programs in too early an exploratory research and development stage to determine with precision their possible arms control implications.

-- Programs providing continuing normal support for existing missions or deployed operational systems and organizations.

-- Production and procurement of a developed weapon system; non-nuclear munitions, cartridges, projectiles, rockets, etc., and associated equipment; spares and repair parts; associated electronic, communications, training and support equipment; support, storage, industrial and test facilities construction and operations; utility and specialized vehicles, ships, tanks, and aircraft; miscellaneous production charges, first destination charges and outfitting costs. In themselves, none of the activities in this category is judged to have a significant impact on arms control policy or negotiations.

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-- Modification or modernization of an already procured system which does not significantly alter the characteristics of the system from an arms control standpoint.

-- Programs which were analyzed as in-depth statements in previous years and found to have little, if any, additional arms control impact.

-- Programs involving miscellaneous research, development, testing, and evaluation of programs not otherwise categorized, which are judged to have marginal, if any, impact on arms control policy or negotiations.

ARMY (RDT&E)

Defense Research Sciences PE 61102A (A1, Line 2)

RDT&E funds to support basic and applied research in the physical, engineering, environmental, biological-medical, and behavioral-social sciences directly related to explicitly stated long-term national security needs and to the solution of identified military problems. This program forms the basis for subsequent exploratory and advanced development programs.

Nuclear Weapons Effects/Fluidics PE 62120A (A1, Line 5)

RDT&E funds to ensure that Army tactical equipment is survivable in a nuclear environment. Technology will be developed to ensure that hardness is maintained during production and fielding of systems.

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Large Caliber and Nuclear Technology   PE 62603A (A1, Line 13)

Includes all exploratory investigations and demonstrations associated with non-nuclear projectile weapons systems of calibers larger than 50 millimeters. Embraces efforts in interior, exterior, and terminal ballistics to include supporting technologies of fuzing, terminal guidance, and energetic materials for all caliber applications. Also includes munitions technology which emphasizes technology development to significantly improve safety and survivability of Army components of nuclear warhead sections.

Infantry Manportable Anti-Armor Weapon System   PE 63612A (A5, Line 100)

Continues the program of competitive flight demonstrations of critical hardware components for two moderate risk anti-armor system concepts.

Mobile Protected Gun   PE 63635A (A6, Line 108)

To provide the light forces (Army & Marine) with a light-weight, strategically deployable, tactically mobile, anti-armor combat vehicle. Vehicle will be used with the Joint Rapid Deployment Force (JRDF).

Advanced Attack Helicopter   PE 64207A (A7, Line 130)

Includes RDT&E funds to develop an advanced, all-weather, attack helicopter capable of defeating tanks, providing quickly responsive aerial fires as an integral element of the ground forces.

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PATRIOT (SAM-D) PE 64307A (A7, Line 140)

Includes RDT&E funds for a surface-to-air missile system to replace improved HAWK and NIKE HERCULES. Efforts include continued development and testing of a counter-antiradiation missile and enhanced capabilities in the area of reduced radar cross-section and high velocity targets.

Heliborne Missile - HELLFIRE PE 64310A (A7, Line 143)

Includes the engineering development of a laser-directed heliborne missile system required by the Army as an advanced anti-armor system. Other advanced terminal homing seekers will be developed.

GRASS BLADE PE 64313A (A7, Line 145)

Special access program.

Multiple Launch Rocket System (formerly GSRS) PE 64314A (A7, Line 146)

RDT&E funds to complete development of the self-propelled fast-reacting multiple rocket launcher which will provide a high volume of fire in a very short time against the surge threat.

Division Air Defense Gun - DIVAD PE 64318A (A7, Line 148)

Includes RDT&E funds to fabricate pre-production prototypes of a modern air defense gun. The system, when fielded, will replace the VULCAN air defense gun system, thereby significantly improving the all-weather capability of air defense in the forward combat areas.

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Tank Systems PE 64620A (A8, Line 162)

Includes RDT&E funds to continue development of the Army's M1 tank. With improved fire control and shoot-on-the-move capabilities, the M1 tank will provide a significant improvement to the Army's offensive ground combat capability with its significantly improved ballistic protection, cross-country agility, and firepower. The M1 will replace M60 series tanks in selected Active Army units.

COPPERHEAD PE 64621A (A8, Line 163)

A cannon-launched guided projectile (CLGP) designed to home on a generated energy source and give a high probability of first round kill.

Tank Gun Cooperative Development PE 64630A (A8, Line 168)

Includes RDT&E funds for development and integration of a 120mm gun into the M1 tank. The program also provides for development of a family of 120mm ammunition to meet user requirements and for modification, redesign, and development of those components of the M1 necessary to accommodate the 120mm gun system.

Joint Tactical Communication Program (TRI-TAC) PE 28010A (A10, Line 209)

Provides new common use, tactical communications systems to replace existent manpower intensive, non-secure, antiquated systems.

SATCOM Ground Environment PE 33142A (A10, Line 210)

Satellite communications terminals for Army tactical ground forces and the Joint Defense Satellite Communication System.

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Kwajalein Missile Range PE 65301A (All, Line 233)

Includes manpower authorizations, peculiar and support equipment, necessary facilities and the associated costs specifically identified and measurable to RDT&E and military construction funds. Kwajalein Missile Range (a national range) has the mission of providing support for strategic offensive and defensive missile and related developmental test programs.

Program-Wide Activities PE 65801A (All, Line 240)

Includes funding for civilian and military manpower and other costs incurred for the operation and maintenance of RDT&E-operated Army headquarters and installations (other than major range and test facility bases) and for logistical and other service support to R&D commands designated as Army Management Headquarters Activities. Also includes support of other administrative activities (e.g., standardization groups and liaison officers) not identifiable with specific research and development projects financed under other program elements. Includes procurement of laboratory special purpose equipment and ADP equipment in support of R&D activities.

DARCOM Major Range and Text Facilities PE 65804A (A12, Line 243)

Includes civilian and military manpower authorizations for necessary facilities, supplies and associated costs at five major DOD development test activities under the US Army Materiel Development and Readiness Command (DARCOM).

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ARMY (Procurement)

(A2, Line 4)

AH-64 Attack Helicopter

Procurement of AH-64 advanced attack helicopters, the twin engine anti-tank weapon system armed with the HELLFIRE laser-guided missile, capable of destroying armored vehicles under day/night and adverse conditions.

(A2, Line 6)

UH-60A BLACK HAWK

Procurement of UH-60A BLACK HAWK helicopters, the twin engine squad carrying helicopter. UH-60A will enhance tactical mobility with increased speed, lift-capacity, range, maintainability and survivability.

(A2, Line 8)

EH-60A (Quick Fix)

Procurement of EH-60A Quick Fix Electronic Helicopters. The EH-60A utilizes the BLACK HAWK airframe for electronic warfare and is designed to identify, locate, listen and disrupt enemy C^3.

(A3, Line 14)

AH-1S Attack Helicopter (COBRA/TOW) Modifications

Provides funds for five product improvement programs on the COBRA/TOW. These are: improved attitude-heading reference system, radar jammer, wire strike protection system, laser warning receiver, and nap-of-the earth communications.

(A3, Line 15)

CH-47C Cargo Helicopter (CHINOOK)

Provides funds for continuation of the CH-47D modernization program, the currently deployed tandem-rotor helicopter which provides air mobility for artillery weapons, ammunition, bulk fuels, troops,

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general cargo, medical evacuation, and recovery of downed aircraft.

Spare and Repair Parts (Aircraft) (A3, Line 22)

Continuing procurement of initial spares and repair parts, replenishment spares and repair parts, and avionics spare parts for Army aircraft.

Common Ground Equipment (A3, Line 25)

Procurement of tools, shop sets, aviation ground support equipment, airfield support equipment, flight simulators and other individual items.

CHAPARRAL (MIM-72-A/C) (A6, Line 1)

Continues procurement of CHAPARRAL replacement motors and the modifications of the CHAPARRAL missile system to increase system operability/reliability.

US ROLAND (A6, Line 3)

Continued production support of US ROLAND missile systems funded in previous years. ROLAND is an all-weather, highly mobile, air-transportable, short-range air defense system providing vital-area defense against high performance, low-flying aircraft.

PATRIOT (SAM-D) (A6, Line 4)

Continues procurement of the PATRIOT air defense system, an advanced surface-to-air missile system with a high single shot kill probability, and a capability for operation in an ECM environment. Its mission is to provide area air defense of the division, corps and high-value

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assets in the rear area. PATRIOT will replace the HAWK and NIKE HERCULES.

STINGER (A6, Line 5)

Continues procurement of the STINGER man-portable, infrared homing air defense weapon which is replacing the REDEYE.

Laser HELLFIRE System (A6, Line 6)

Provides funds for the continued procurement of the HELLFIRE missile which has been developed as the primary anti-tank weapon for the AH-64 Attack Helicopter.

TOW (BGM-71A) (BTM-71A) (A6, Line 8)

Provides for the continued procurement of a heavy anti-tank missile system for maneuver battalions and the AH-1 COBRA/TOW helicopter.

Multiple Launch Rocket System (MLRS) (A6, Line 10)

Continued procurement of MLRS rockets and associated ground support equipment. MLRS is a self-propelled multiple rocket launcher system designed to counter enemy field artillery air defense systems and supplement cannon artillery.

HAWK (Modifications) (A6, Line 12)

Continued procurement of HAWK replacement motors and for modifications of the system to improve operability/reliability.

TOW (Modifications) (A6, Line 13)

Continued procurement and improvement of the currently deployed Army improved TOW.

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GRASS BLADE (A7, Line 19)

A controlled access program.

Spares & Repair Parts (Missiles) (A7, Line 21)

Continuing procurement of initial spares and repair parts, replenishment spares and missiles for Army missile systems.

Production Base Support (Missiles) (A7, Line 24)

Continued procurement of equipment used for production testing and depot maintenance support. Development of manufacturing methods and technology projects that deal with the advancement of manufacturing techniques.

Fighting Vehicle System (A9, Line 3)

Procurement of infantry and cavalry fighting vehicles. Systems are full-tracked, armored vehicles which provide mechanized infantry and cavalry units with protected cross-country mobility and vehicular mounted firepower. Vehicles are designed to be compatible with the new M1 main battle tank.

Tank, Combat, FT, 105mm Gun, M1 Series (A9, Line 9)

Procurement of M1 main battle tanks. The M1 will initially mount a 105mm main gun and three complementary armament systems with improved fire control and shoot-on-the move capabilities. It will have improved ballistic protection, higher cross country speeds and faster acceleration. In FY 1985 it will incorporate a 120 MM gun.

FIST Vehicle Modification (A9, Line 14)

Provides funds for the procurement of kits required to convert M113

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armored personnel carriers to fire support team vehicles. FIST vehicles will provide protection for the Ground Laser Locator Designator.

Spares and Repair Parts (Weapons and Tactical Combat Vehicles) (A10, Line 20)

Initial procurement and replenishment of spares and repair parts related to tracked combat vehicles.

Production Base Support (TCV-WTCV) (A10, Line 22)

Includes depot maintenance and plant equipment requirements. Major areas of emphasis are: (a) M1 production support; (b) 120mm gun integration; (c) rehabilitation of the Stratford Army Engine Plant and modernization of fire control production facilities.

DIVAD Gun (A10, Line 24)

Continues procurement of an all-weather Air Defense System consisting of twin 40mm cannons, search and track radars mounted on an M48A5 tank chassis. Will provide air defense protection to forward maneuver elements of the field Army.

Production Base Support (WOCV-WTCV) (A11, Line 39)

Continues the modernization of the cannon production base at Watervliet Arsenal and modernization efforts at Rock Island Arsenal.

Nuclear Weapons Support Material (A13, Line 1)

Provides for continuing procurement of nuclear weapon support material for deployed operational systems.

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Conventional Ammunition Procurement (A13-15, Lines 5-54)

Provides for procurement of conventional ammunition of various types and categories for the US Army. Includes: cartridges, fuzes, projectiles, primers, small missiles and rockets, and mines.

Provision of Industrial Facilities (Ammunition) (A16, Line 65)

Provides for establishment, rehabilitation, modernization, and expansion of government owned facilities to support production of ammunition.

Truck, 5T, 6 X 6, All Body Types (A18, Line 16)

Procurement of 5-ton wheeled tactical vehicles. Vehicle is produced in 7 body styles: cargo, dump, tractor, van, wrecker, stake and bolster.

Truck, 10T, 8 X 8, All Body Types (A18, Line 17)

Provides funds for procurement of 10-ton wheeled tactical transport vehicles. Truck is required to transport ammunition, petroleum, and missile systems, and can be used for recovery of other heavy wheeled support vehicles and combat systems. Major systems supported include MLRS, PERSHING II and PATRIOT.

Spare and Repair Parts (Tactical Vehicles) (A19, Line 23)

Provides for the continuing procurement of spares and repair parts for Army tactical vehicles.

Speech Secure Equipment TSEC/KY-57 (A24, Line 120)

Procurement of tactical secure voice equipment designed for manpack and vehicular application. Provides secure transmissions for tactical systems such as TACFIRE and FIREFINDER.

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Tactical Mgt Info System (TACMIS) (A25, Line 144)

Consists of mobile or transportable militarized or commercially available general purpose computer equipment utilized to automate standard personnel and logistics functions in combat service support units from the brigade to the theater rear.

Tactical Jamming System (TACJAM) AN/MLQ-34 (A25, Line 151)

Continued procurement of the ground based tactical jamming system to be targeted against hostile communication emitters.

Ground Laser Locator Designator (GLLD) (A26, Line 160)

Laser designator used by military fire support teams to range/designate targets for attack with laser guided munitions (COPPER-HEAD, HELLFIRE).

Radar Set, Mortar Locating, AN/TPQ-36 (A26, Line 170)

Continued procurement of a counter mortar radar that will detect hostile mortars, artillery and rockets at short and mid-ranges.

Radar Set, Artillery Locating AN/TPQ-37 (A26, Line 171)

Continued procurement of a counterbattery radar that will automatically locate hostile artillery and long-range rocket launch sites.

Spares and Repair Parts (Electronics) (A27, Lines 178-180)

Provides funds for the procurement of initial and replenishment spares and repair parts to support Army electronic systems.

Medical Support Equipment (A31, Line 259)

Procurement of equipment required to support health care programs

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in fixed TDA/MTDA medical facilities/activities world-wide. Includes initial and replacement equipment for Army health care facilities.

NAVY (RDT&E)

Defense Research Sciences PE 61153N (N1, Line 2)

A continuing program, the purpose of which is to conduct research in the physical, engineering, environmental and life sciences in order to obtain information and understanding which can lead to discoveries of potential importance to the Navy, the solution of Navy technical problems, and the improvement of Navy operations.

SSBN Security Technology Programs PE 11224N (N4, Line 68)

Provides for a technological assessment of the potential capability of the Soviet Union to threaten covert mobility of the Fleet Ballistic Missile Submarine Force and development of counter-measures technology.

Nuclear Propulsión Technology PE 62542N (N1, Line 6)

A comprehensive exploratory development program directed toward the development and application of advanced technologies for potential utilization in Navy nuclear propulsion plants.

Ships/Subs/Boats Technology PE 62543N (N1, Line 7)

Program develops the basic technology necessary to achieve significant advances in the performance of naval ships, submarines and boats, and in reducing their acquisition and support costs.

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Environmental Applications PE 63207N (N2, Line 27)

Related projects which provide environmental support for global naval operations; i.e., assessment and exploitation of environmental effects on weapon systems, emerging environmental data collection technology, and remote sensing of the ocean/atmosphere environment.

Submarine ASW Stand-off Weapon PE 63367N (N5, Line 96)

Program to continue the demonstration and validation phase of the ASW stand-off weapons program. System is designed to provide a counter to the projected Soviet submarine threat.

Submarine Sonar Developments PE 63504N (N5, Line 104)

Provides for the advanced development and testing of improvements to present and future integrated sonar systems to maintain acoustic superiority over 1985-2020 high performance submarines and surface ship threat.

PILOT FISH PE 63525N (N6, Line 117)

Limited access program.

RETRACT SILVER PE 63537N (N6, Line 125)

Limited access program.

Submarines PE 63561N (N6, Line 129)

Advanced submarine development programs which include: atmosphere control systems; propulsion safety; efforts to extend operational depths of future submarines; damage control equipment; shock hardening and submarine propellers.

Submarine Tactical Warfare Systems PE 63562N (N6, Line 130)

Program provides for the development of submarine tactical warfare

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systems which include: torpedos; acoustic and torpedo counter-measures; the reduction of own-submarine target strength systems; tactical situations display and incorporation of communication data links for attack submarine command and control.

Special Test Systems PE 63575N (N7, Line 138)

A continuing controlled access program.

Advanced ASW Torpedo PE 63610N (N7, Line 145)

This program is designed to develop a new torpedo capable of countering predicted improvements in Soviet submarine performance characteristics. It will replace the current lightweight MK-46 torpedo.

Tactical Nuclear Weapons Development PE 63634N (N7, Line 147)

Includes RDT&E funds to support joint DOE/Navy Phase 1 conceptual and Phase 2 technical feasibility advanced development efforts leading to the modernization of Navy and Marine Corps tactical nuclear weapons.

Special Processes PE 63787N (N8, Line 163)

A continuing controlled access program.

Light Airborne Multi-Purpose System MK III PE 64212N (N8, Line 170)

Includes RDT&E funding to provide for development of a computer integrated ship/helicopter system optimized for anti-submarine warfare. System has a secondary mission of antiship surveillance and targeting.

AV-8B Aircraft PE 64214N (N8, Line 172)

Provides funds for continued RDT&E of light attack aircraft designed

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to operate from austere forward sites in direct support of ground forces. Aircraft will meet Marine Corps requirements as follow-on improvement to the HARRIER.

Navy Air Combat Fighter, F/A-18 Naval Strike Fighter PE 64263N (N9, Line 188)

Provides funds for developing the F-18 Naval Strike Fighter. A twin engine, multi-mission tactical aircraft to be employed in both Navy and Marine Corps fighter and attack squadrons, the F-18 will replace the aging F-4 and A-7 aircraft, and complement the F-14 aircraft.

Aircraft Engine Component Improvement Program PE 64268N (N9, Line 192)

This program provides the engineering support required to obtain changes which are essential for satisfactory system performance throughout the operational life of the system.

High-Speed Anti-Radiation Missile PE 64360N (N9, Line 201)

A joint Navy/Air Force program to develop a lethal defense suppression weapon system capable of destroying elements of an enemy air defense radar network. FY 1983 program provides funds to complete RDT&E and to initiate full-scale production of Navy & Air Force missiles.

Submarine Combat Systems Development PE 64524N (N10, Line 219)

Provides for competitive engineering development of a new generation combat suite for attack submarines; intended to provide the ships with clear tactical superiority in engagements with improved threat

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platforms.

Submarine Tactical Warfare Systems PE 64562N (N10, Line 223)
Program accomplishes design, engineering development, and test and evaluation of submarine tactical warfare systems & weapons.

Ship Development PE 64567N (N10, Line 225)
Program element includes contract design phase for non-strategic ships, and the engineering development phase of selected systems/ submarine systems for these ships.

Tactical Information Systems PE 25604N (N12, Line 270)
Provides funds for the Joint Tactical Information Distribution Systems and integrated communication navigation and indentification system which will provide secure, jam-resistant communication in aircraft applications.

Special Activities Support PE 34111N (N14, line 306)
A continuing limited access program.

Aerial Target System Development PE 64258N (N15, Line 310)
This program provides for engineering development of target systems and associated electronic and infrared sub-systems necessary to duplicate or simulate threat characteristics, radar cross sections, infrared signature, radio frequency emissions, and control systems.

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<u>LANT Undersea Test/Evaluation Center</u> PE 65852N (N15, Line 319)

This program provides, on a continuing basis, the operational maintenance support for the Navy's only secure and fully instrumented anti-submarine warfare test and evaluation range.

<u>RDT&E Laboratory/Facility Management Support</u> PE 65861N (N15, Line 324)

A continuing program which provides for certain program-wide management and operations costs at specified R&D laboratories and other facilities.

<u>RDT&E Instrumentation/Material Support</u> PE 65862 (N15, Line 325)

A continuing program which funds all investment costs and certain support costs at Navy RDT&E labs and other facilities.

<u>RDT&E Ship/Aircraft Support</u> PE 65863N (N15, Line 326)

Includes RDT&E funds to provide for operation and maintenance of ships and aircraft assigned for support of weapon system RDT&E projects. Also funds aircraft conversions to target drones in support of weapon system testing.

<u>Test/Evaluation Support</u> PE 65864N (N15, Line 327)

The annual institutional funding for the operation, maintenance and test instrumentation and separate improvement at four of the six Navy DOD major range and test facility base activities. These facilities include Pacific Missile Range, Naval Air Test Center, Naval Air Propulsion Test Center and Naval Weapons Center Ranges.

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In addition, investment costs at Lakehurst Naval Air Station are funded within this program element.

NAVY (PROCUREMENT)

EA-6B PROWLER (N2, Lines 3 & 4)

Continued procurement of the four place, twin-engine, advanced electronic warfare aircraft which provides protection to Navy strike aircraft through a computer controlled electronic surveillance control system and high power jamming transmitters.

F-14A (TOMCAT) (N2, Lines 7 & 8)

Continued procurement of carrier based air superiority/fleet air defense fighters capable of air-to-air combat and air-to-surface attack missions. System has visual attack and all-weather capability.

F-18 (HORNET) (N2, Lines 9 & 10)

Continued procurement of single seat, carrier based, high performance, multi-mission, fighter aircraft. Missions include fleet air defense, air superiority, air-to-ground interdiction.

CH-53E SUPER STALLION (N23, Lines 11 & 12)

Continued procurement of the three engine, shipboard compatible, Navy and Marine Corps heavy lift helicopter. Designed for heavy cargo/troop/transport in Marine Corps missions. Navy missions include vertical on-board delivery for fleet replenishment.

SH-60B (LAMPS MK III) (N3, Lines 13 & 14)

Continued procurement of the small sea-based helicopter configured to operate from destroyer type ships. The SH-60B is optimized for

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anti-submarine warfare with a secondary mission of anti-ship surveillance and targeting.

P-3C ORION (N3, Lines 15 & 16)

Land-based, multi-engine, turbo prop, maritime patrol aircraft with primary missions of ASW warfare. Secondary missions are maritime reconnaissance, aerial mining, shipping destruction and intelligence collection. Programmed force level is the procurement of 24 squadrons by FY 1986.

E-2C HAWKEYE (N3, Lines 17 & 18)

Continued procurement of the carrier-based, twin-engine, turboprop airborne early warning aircraft designed for airborne early warning and command and control under all weather conditions.

SH-2F (ASW Helo) SEA SPRITE (N3, Line 19)

Continued procurement of twin-engine helicopter designed as the air sub-system of the LAMPS MK1 weapon system. System is deployed aboard FF1040 and FF1052 class frigates in the primary role of anti-submarine warfare.

VCX (N4, Line 22)

Advanced procurement for VCX aircraft to be procured in FY 1984. VCS is a carrier-capable delivery aircraft used to fulfill the airlift support requirements of the fleet.

EC-130Q (TACAMO) HERCULES (N4, Line 26)

Continued procurement of the basic C-130 aircraft, modified for airborne communications. In this configuration the EC-130Q is

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provided with increased engine performance, and special communications, navigation and flight instrument systems.

<u>A-4 Series Modifications</u>

(N4, Line 28)

Program represents a series of A-4 aircraft modifications, paramount among which is the replacement of the current ejection seat with a state-of-the-art model currently being procured for the A-7. Also included are modifications to provide needed additional combat mission counter-measures warning and direction finding capability.

<u>A-6 Modifications</u>

(N4, Line 29)

Hydraulic, electrical and avionics modifications to the A-6 all-weather attack aircraft that extends the service life and updates the capabilities of the aircraft.

<u>EA-6 Series Modifications</u>

(N4, Line 30)

A series of modification programs to update carrier-based electronic warfare aircraft. Modifications are designed <u>inter alia</u> to improve reliability and maintainability, enhance survivability, lessen life cycle costs and improve readiness.

<u>A-7 Modifications</u>

(N4, Line 31)

Primarily avionic modifications to the carrier-based, attack A-7 aircraft. Will provide a passive night vision capability to enhance weapons delivery accuracy during night operations, improve navigation, provide counter-measures warning, and improve operational readiness, and minimize life cycle costs.

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(N4, Line 31)

F-4 Modifications

Provides for the continued modification of the F-4 air superiority fighter aircraft. Major modifications include service life extension work on the basic airframe and improved radio and navigation equipment.

(N5, Line 35)

F-14A Modifications

A series of modifications, the most significant of which is the replacement of redesigned engine components to achieve improved durability, reliability, and maintainability changes to the aircraft.

(N5, Line 40)

H-46 Modifications

Major modifications include service life extension work on the basic airframe, rotorblade improvements and navigation equipment modernization for the Navy's general purpose logistics and troop carrying helicopter.

(N5, Line 44)

H-3 Series Modifications

Major modifications include service life extension work on the basic airframe and main gearbox of this aircraft model.

(N5, Line 47)

P-3 Series Modifications

A series of modifications, the most significant of which are associated with the HARPOON missile and the infrared detecting system.

(N5, Line 48)

S-3 Modifications

Modifications of the S-3 series aircraft initiated to correct deficiencies that adversely impact on aircraft mission, capability and safety and to reduce maintenance actions and operational problems.

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<u>E-2 Series Modifications</u> (N5, Line 49)

Modification incorporates an advanced radar processing system that allows fully automatic overland detection and improved electronic counter counter-measures.

<u>Common ECM Equipment</u> (N6, Line 62)

Provides funds for development and procurement of radar warning receiver system and related systems and EW systems improvements.

<u>Spares and Repair Parts (Aircraft)</u> (N6, Line 64)

Repairable parts procured in support of operating forces and industrial activities within the naval aviation establishment. Includes all Navy aircraft.

<u>Common Ground Equipment</u> (N6, Line 65)

Common ground equipment includes avionics support, aircraft systems trainers, training aids and devices, and miscellaneous aircraft maintenance and ground support equipment.

<u>Aircraft Industrial Facilities</u> (N6, Line 66)

Provides for calibration equipment for Navy standards and calibration laboratories. Also provides for capital improvements, modernization, and maintenance of government-owned, but contractor-operated, aircraft producing industrial plants.

<u>Other Production Charges</u> (N6, Line 68)

Provides funds for miscellaneous production support and testing services, aircraft cameras, various equipment for US Coast Guard aircraft and ground support equipment and other support costs for out-of-production aircraft.

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AIM 7/M SPARROW (N10, Line 10)

Continued procurement of a conventionally-armed, radar-guided (SPARROW-III) missile used in air-to-air and ship-to-air weapon systems now in the inventory.

AIM 9/M SIDEWINDER (N10, Line 26)

Continued procurement of the joint USN/USAF short range, air-to-air, infrared (IR), dogfight missile employed by both fighter and attack aircraft. Provides significant improvement over previous SIDEWINDER versions by increasing the firing envelope through its all-aspect launch capability.

AIM 54A/C PHOENIX (N10, Line 27)

Continued procurement of a conventionally-armed, air-to-air, guided missile carried aboard the F-14 aircraft in order to replenish training ammunition expended and to outfit new squadrons.

AGM-88A HARM Missile (N9, Line 16)

Continued procurement of the high speed, air-to-surface, anti-radiation, HARM missile designed to suppress or destroy land and sea-based radars supporting enemy air defense systems.

Aerial Targets (N9, Line 24)

Procurement of aerial targets to provide realistic presentations of potential threats to support Navy training in the use of missiles and anti-aircraft guns.

Spares and Repair Parts (Missiles) (N10, Line 32)

Spares and repair parts for the repair of missiles or components which fail or are damaged while in the fleet.

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Weapons Industrial Facilities (N10, Line 33)

Provides for the production support for missile, torpedo, mine and gun producing industrial facilities at other than in-house facilities.

Classified Projects (N10, Line 35)

Limited access program.

Torpedo MK-48 Modifications (N10, Line 37)

The MK-48 torpedo is an in-service conventional weapon used in both the ASW and anti-ship role. Modifications are aimed at improving reliability, maintainability and reducing life cycle costs.

Torpedo MK-46 NEARTIP (N10, Line 38)

Provides for the continued peocurement of the MK-46 lightweight ASW torpedo launched from surface ship torpedo tubes, ASROC launchers, and fixed and rotary wing aircraft.

MK-60 CAPTOR (N10, Line 39)

Provides for the continued procurement of CAPTOR weapons, and fleet support items. The CAPTOR is a moored, influence-activated, ASW mine which employs a modified MK-46 torpedo as a payload.

Torpedo Support Equipment (N11, Line 47)

Provides the fleet with the components necesary to restore weapons used to conduct training exercises which involve torpedo live firings.

MK-15 PHALANX Close-in Weapons System (N11, Line 49)

Provides for the backfit of the PHALANX fast-reaction, last-ditch, air defense system in active fleet ships.

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SSN-688 Class Nuclear Submarine (N15, Line 7)

Provides for the construction of one follow-on SSN-688 class nuclear submarine, the only weapon system capable of operating for long periods of time in waters under enemy air/water and surface control. The SSN-688 submarine will provide the characteristics necessary to counter the new classes of Soviet high speed submarines in addition to providing improved sensor and weapons systems.

FASSN Class Nuclear Submarine (N15, Line 8)

Provides for the procurement of long leadtime nuclear propulsion plant equipment, and the commencement of detailed design of a new class of nuclear submarines.

CV Service Life Extension Program (SLEP) (N15, Line 9)

The aircraft carrier service life extension program (SLEP) will extend the life of FORRESTAL class aircraft carriers from 30 years to 45 years. Includes propulsion, auxiliary equipment and electronics.

CG-47 AEGIS Cruiser (N15, Line 11)

New class of guided missile cruiser, armed with AEGIS and other advanced AAW/ASW/SUW systems to operate with Main Battle Groups and Amphibious Task Groups. The CG will be a broadly capable, heavily-armed and survivable cruiser for the Navy.

FFG Guided Missile Frigate (N16, Line 15)

Continued procurement of FFG-7 class frigates which are designed to provide self-defense and supplement existing escorts in the protec-

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tion of underway replenishment groups, amphibious forces and mercantile shipping.

Maritime Prepositioning Ship (T-AKX) (N16, Line 17)

Authorization requested for one Maritime Prepositioning Ship; will provide prepositioned combat unit equipment and supplies to support specially organized Marine amphibious brigades.

Service Craft (N17, Line 28)

Authorization is required for four harbor tug boats and one training craft.

Outfitting (N17, Line 31)

Government furnished repair parts and other material, including stock fund items and general use consumables, required to fill ships' initial allowance of storeroom and operating spare items.

Post Delivery (N18, Line 32)

Design, planning, government furnished material and related labor costs required to correct ship deficiencies defined during acceptance and shakedown trials.

Reactor Power Units (N22, Line 43)

Assemblies of nuclear fuel and associated structural and reactivity control equipment required for the periodic refueling of nuclear powered ships.

Reactor Components (N22, Line 44)

Includes the components, equipment and material required to provide minimum support needed for the continued safe and re-

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liable operation of Navy nuclear propulsion plants. Funds are programmed for acquisition of replacement components for ship alterations, replacement of stock spare components, and equipment necessary for refueling nuclear powered ships.

Shipyard Modernization Equipment (N23, Line 54)

Provides the investment required for industrial and other plant equipment necessary to support the Shipyard Modernization Program.

Spares & Repair Parts (N23, Line 58)

Repairable parts procured in support of operating forces and industrial activities within the naval establishment.

AN/BQQ-5 (N24, Line 73)

Towed array sonar for detection of submarines, surface ships, ASW helicopters and torpedoes. Procurement of eight systems for SSN 594/637 backfit.

Sonar Switches and Transducers (N24, Line 78)

Program provides in-service, anti-submarine warfare sonars on surface ships and submarines. Components are required to support units in the fleet on a replacement basis on regularly scheduled ship overhauls and when units are reported defective due to age, obsolescence, or casualty.

AN/SQR-19 (TACTAS) (N25, Line 89)

Towed array tactical sonar program.

AN/WLQ-4(V) (PRAIRIE WAGON) (N26, Line 108)

A classified program.

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Naval Tactical Data System (N26, Line 113)

Provides: (a) general purpose combat direction system in major warships permitting rapid integration of ship sensor information; (b) analysis of operational data; and (c) initiation of instantaneous ship or fleet reaction in accordance with fleet doctrine stored in computer memories.

SATCOM Ship Terminals (N28, Line 161)

Program continues the procurement of demand-assigned, multiple access systems which provides up to a five-fold increase in satellite channel capacity. These terminals provide high data rate anti-jam communications via the DS/CS satellite systems.

Spares and Repair Parts (N30, Line 191)

Provides for procurement of electronic parts and assemblies for miscellaneous communications and electronic equipment.

AN SSQ-41 JEZEBEL (N30, Line 193)

A passive, omni-directional sonobuoy used during the search and localization phases of the air ASW mission to detect and classify submarines.

AN/SSQ-53 DIFAR (N30 Line 195)

A passive, directional sonobuoy used during the localization phase of the air-ASW mission; provides accurate target localization information.

AN/SSQ-77 (VLAD) (N30, Line 198)

A passive, directional sonobuoy that provides a 7-10 db improvement over the current AN/SSQ-53A system.

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General Purpose Bombs (N31, Line 201)

Provides funds for continuing procurement of general purpose bombs to support Navy mission requirements.

Practice Bombs (N31, Line 208)

Provides funds for continuing procurement of practice bombs and marker signals.

5/54 Ammunition Components (N32, Line 238)

Provides monies for ship gun ammunition (20MM thru 8-inch). Includes ammunition required for fleet training, gun calibration tests, new production trials and reserve ammunition.

Spares & Repair Parts (N35, Line 283)

Provides for the procurement of initial spare parts to support new end items for the replenishment spare parts consumed by the fleet.

Trucks (N35, Line 285)

Provide funds for the replacement and/or initial outfitting of trucks (out of a total inventory of 33,237).

Amphibious & Special Equipment (N35, Line 294)

Provides the Naval Construction Force with the equipment necessary to maintain a readiness to meet contingency requirements. Includes funds for the Maritime Prepositioning Program in support of the Rapid Deployment Force.

Medical Support Equipment (N37, Line 329)

Provides for the acquisition of medical and dental equipment in support of direct health care delivery. Supports 23 regional

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medical centers, 8 hospitals, 8 regional medical clinics, 6 branch hospitals, 23 regional dental centers, 11 specialized medical units and 5 training facilities which together with their branch facilities comprise 383 individual activities. Funds are required to replace worn-out, obsolete equipment and to provide for the acquisition of new technological developments for a modern health care delivery system.

Projectile, 155MM, ICM (DP) (N40, Line 11)

Provides funding for continued procurement of improved conventional munitions projectile for 155MM howitzer.

LVT7A1 (N41, Line 34)

Continues a four year effort of materiel and vehicle assembly.

LVT7 Service Life Extension Program (SLEP) (N41 Line 35)

Continues procurement of kits for the conversion of LVT7 SLEP vehicles. The LVT7 SLEP is a product improvement program designed to extend the useful life of the present amphibian vehicle (1989 or beyond).

Light Armored Vehicle (N41, Line 36)

Continues the acquisition of the light armored vehicle. Vehicle is fully equipped with weapons, fire control systems, support equipment and supplies. These vehicles will be used to begin formation of a rapidly deployable combat unit.

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AIR FORCE (RDT&E)

Defense Research Science PE 61102F (Fl, Line 2)

The funding base for a continuing program to obtain scientific knowledge required to provide alternatives for future development, prevent technological surprise, and assist in the solution of technical problems, thereby enhancing Air Force mission area operational capabilities. Program maintains in-house scientific expertise for immediate availability when needed by the Air Force.

Materials PE 62102F (Fl, Line 4)

Program supports Air Force exploratory materials developments. It develops new and improved materials which are required to meet the increased performance, reliability and survivability of current and future areospace systems. Includes RDT&E funds for contract and in-house effort of the Air Force Materials Laboratory (AFML) located at Wright-Patterson AFB, Ohio.

Aerospace Flight Dynamics PE 62201F (Fl, Line 5)

Provides the flight vehicle technologies required for the design and development of future aircraft, missile and spacecraft, and for the improvement of current vehicles. The program also provides for the contract and in-house effort of the Air Force Flight Dynamics Laboratory (AFFDL) located at Wright-Paterson AFB, Ohio.

Aerospace Biotechnology PE 62202F (Fl, Line 6)

Program includes investigation into the protection of man in

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hazardous operations and man-machine integration technology for system design and operation. The program funds the operational support and management for the RDT&E contract in-house efforts of the following: Aerospace Medical Divison (AMD), Brooks AFB; 6571st Aerospace Medical Research Lab, Wright-Patterson AFB; and USAF School of Aviation Medicine, Brooks AFB.

Aerospace Propulsion PE 62203F (Fl, Line 7)

Program develops the propulsion and power technology in support of current and future aerospace vehicles and weapon systems. Includes RDT&E funds for the contract and in-house efforts of the Aerospace Propulsion Laboratory (AFAPL) located at Wright-Patterson AFB, Ohio.

Aerospace Avionics/VHSI Circuits PE 62204F (Fl, Line 8)

This program develops avionics technology which improves the functions of aerospace vehicle command, control, navigation, penetration, defense, reconnaissance, fire control, and weapon delivery. These improvements will result in higher reliability, and greater mission effectiveness. The program also provides for the operations and management of the Air Force Avionics Laboratory at Wright-Patterson AFB, Ohio.

Aircraft Propulsion Subsystem Integration PE 63202F (Fl, Line 16)

Provides for the design, development and test of new techniques aimed at propulsion/airframe, integration and capability and improved installed performance in advanced aircraft. This program

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will provide aircraft systems with the potential for longer range, higher speed, lower fuel consumption, high sortie rates, and reduced life cycle costs.

Command/Control/Communications PE 62702F (F1, Line 13)

This program element provides a broad technology base for advancing Air Force mission capabilities in command, control and communications. Six basic technology areas are pursued: surveillance; intelligence; communications and control; information sciences; electronic reliability and electromagnetic compatibility; and electromagnetic radiation, devices and components. The program element also provides for the operation and management of the Rome Air Development Center, Griffiss AFB, and the RADC Deputy for Electronic Technology, Hanscom AFB.

Space Communications PE 63431F (F3, Line 52)

The only Air Force program for advance development of satellite communications system concepts, techniques and technologies. Program identifies, develops, demonstrates, evaluates, and transitions to operational systems the satellite and airborne terminal technology required to support global command, control and data relay communications.

Companion Trainer Aircraft Development PE 64758F (F4, Line 63)

Air Force initiative to investigate the use of an off-the-shelf, low cost, modified business jet to provide B-52 air crews with realistic inflight training in basic airmanship, navigation, crew coordination, and primary mission tasks. This aircraft offers a potential savings of 100 million gallons of fuel per year and

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would contribute to extending the service life of the aging B-52 aircraft.

Air Force Satellite Communications Systems PE 33601F (F4, Line 83)

Program consolidates the development, procurement and installation of the ground aircraft and satellite communication equipment needed to satisfy critical needs of the national command authorities and the military commanders-in-chief for worldwide communications.

Advanced Attack Weapons PE 63609F (F5, Line 97)

Program develops and demonstrates prototype air-to-surface non-nuclear weapons. Funds will be used to develop two wide-area antiarmor munitions: the WASP mini-missile and the Extended Range Antiarmor Munition.

Special Programs PE 63801F (F6, Line 107)

Limited access program.

Nuclear Weapons Support PE 64222F (F6, Line 113)

Includes RDT&E funding to provide continuing support for activities that develop hardware associated with nuclear weapons (other than warheads) and activities that provide for safe and effective nuclear weapons delivery.

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Night Precision Attack PE 64249 (F6, Line 116)

The Low Altitude Navigation and Targeting Infrared System for Night (LANTIRN) will provide a capability for low level precision attack and other than optimal weather conditions in air-to-surface interdiction and close air support missions.

Advanced Medium-Range Air-to-Air Missile PE 64314F (F6, Line 118)

A joint Air Force/Navy program to develop an AIM-7/SPARROW follow-on air superiority air-to-air missile, compatible with the F-14, F-15, F-16, F-18 and appropriate NATO aircraft. The first guided test vehicle firing is planned for late FY 1983.

Air Launched ASSAULT BREAKER PE 64616F (F6, Line 129)

System will provide conventional standoff antiarmor warfare capability. System consists of ASSAULT BREAKER air-launched missiles and PAVE MOVER target acquisition and missile guidance commands.

Precison Location Strike System PE 64742F (F7, Line 143)

Program is designed to develop and test a tactical strike system primarily to suppress enemy air defenses. System was rated by 1977 Air Force/Army Tactical Reconnaissance Force Mix Study as the highest priority system in terms of cost versus payoff.

Joint Tactical Information Distribution System (JTIDS) PE 64754F (F7, Line 148)

A joint service program, to develop a time-ordered, secure, jam-resistant, low intercept potential, digital information distribution system for use in a tactical combat environment.

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F-4, F-15, A-10 and F-16 Squadrons

F-4	PE 27128F (F8, Line 153)
F-15	PE 27130F (F8, Line 155)
A-10	PE 27131F (F8, Line 156)
F-16	PE 27133F (F8, Line 157)

Programs provide for engineering design and development of systems update as required. Continuing programs include flight tests, management engineering support and systems integration.

Tactical Airborne Command Control Systems — PE 27417F (F8, Line 165)

Program has as its main purpose the development and acquisition of an airborne surveillance system for command and control of tactical forces and strategic defense of the United States. Includes the manpower authorization, peculiar and support equipment, necessary facilities, and the associated costs specifically identified and attributable to the Airborne Warning and Control System (AWACS).

Special Activites — PE 34111F (F9, Line 187)

Limited access program.

Space Test Program — PE 63402F (F10, Line 194)

Program funds space flight for demonstrating new system design and concept and for determining environmental effects on military systems. The space test program is to be the pathfinder for exploiting the space shuttle as a manned space laboratory.

Aircraft Engine Component Improvement Program — PE 64268F (F6, Line 117)

Aircraft Engine Component Improvement Programs (ECIP) are initiated after an engine/component is accepted by the Air Force. System

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changes continue throughout the operational life of a system. These programs provide engineering support required to obtain engine changes which are essential for satisfactory system performance in operational use.

Space Shuttle PE 64411F (F10, Line 199)

Program has as its main objectives: (1) supporting NASA development and assuring the utility to DOD of the Space Transportation System; (2) transitioning critical national defense satellites to the space shuttle; (3) developing an inertial upper stage for use with the Space Shuttle, and (4) acquiring and operating general purpose space shuttle launch and landing facilities at Vandenberg AFB, California.

Acquisition and Command Support PE 65806F (F10, Line 205)

Provides funding support for the Headquarters Air Force Systems Command, Aeronautical Systems Division, Electronic Systems Division, Aerospace Medical Division, Space Division, Armament Divison and the Ballistic Missile Office.

Test and Evaluation Support PE 65807F (F10, Line 206)

Provides funding support for operating five test activities within the Air Force Systems Command: (1) Arnold Engineering Development Center, (2) Armament and Development Test Center, (3) Air Force Flight Test Center, (4) 4950th Test Wing and (5) the Western Space and Missile Center.

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<u>Defense Meteorological Satellite Program</u> PE 35160F (F11, Line 213)

An advanced weather satellite system which provides visual and infrared cloud cover data and other meteorological, oceanographic, and solar-geophysical information over the entire surface of the earth in support of strategic and tactical missions.

Air Force (Procurement)

<u>F-15 A/B/C/D</u> (F2, Line 4 & 5)

Provides for the procurement of F-15 aircraft, a twin engine, swept wing aircraft designed specifically for high maneuverability in air-to-air combat.

<u>F-16 A/B</u> (F2, Lines 6 & 7)

Provides for the procurement of F-16 multi-purpose single-seat, fixed wing, high performance fighter aircraft capable of performing a broad spectrum of tactical air warfare tasks.

<u>KC-10A Advanced Tanker/Cargo Aircraft</u> (F2, Line 8)

Provides for the procurement of tanker/cargo aircraft. A derivative of the currently available wide bodied DC-10 modified to provide a refueling capability and to exploit the cargo-carrying potential inherent in the existing aircraft design.

<u>Tactical Airborne Command and Control System (AWACS) E-3A</u> (F2, Line 9; F3, Line 10)

Provides for the procurement of E-3A (AWACS) aircraft. E-3A is a survivable airborne surveillance, command and control communications system which consists of special avionics and a large surveillance radar installed in a modified Boeing 707-320B airframe. Mission is to

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provide battle management in conducting air warfare in a tactical theater and strategic air defense.

TR-1A (F3, Line 15 & 16)

Provides for the procurement of TR-1A aircraft, a variant of the U-2R aircraft, to provide a high altitude, stand-off battlefield surveillance/reconnaissance capability for theater/tactical commanders. Equipped with the latest electronic sensors being developed in other programs, the TR-1 will provide an effective battlefield surveillance system into the 1990's.

A-10 Modifications (F4, Line 21)

Program provides for continuation of A-10 update efforts. Program includes initiation of an engine monitoring system, and the SEEK TALK jam-resistant radio program, and continuation of an inertial navigation system.

F/RF-4 Modifications (F4, Line 22)

Provides for the continuation of previously initated modifications which include inter alia: a chaff and flare dispenser capability; radar warning upgrade; replacement of the inertial navigation system; and various safety and reliability improvements.

F-15 Modifications (F4, Line 24)

Program includes continuation of previously initiated modifications and initiation of a satellite defense capability.

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<u>F-16 Modifications</u> (F4, Line 25)

Program continues the update of operational aircraft to a standard configuration and initiates the SEEK TALK anti-jam communications capability.

<u>F-111 Modifications</u> (F4, Line 26)

Program provides for continuation of previously initiated modifications, e.g., secure voice capability, correction of avionic deficiencies, plus initiation of various reliability and safety modifications to the engine and airframe.

<u>EF-111</u> (F4, Line 27)

The FY 1983 program completes the production buy of the ALQ-99 electronic countermeasure sub-system for EF-111 aircraft. The EF-111 will provide the capability to accomplish all tactical jamming support missions.

<u>C-5 Modifications</u> (F4, Line 29)

Program continues the wing replacement modification necessary to achieve an increased 30,000 flying hour service life, and other previously initiated modifications of lesser magnitude.

<u>C-141 Modifications</u> (F4, Line 30)

This program continues the procurement of a digital flight data recorder, a fuel savings advisory system, the replacement of the rudder power control cylinder and other reliability and safety modifications. Program also initiates procurement of a deployable crisis management capability.

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C-130 Modifications (F5, Line 33)

This program continues the wing modification and other efforts begun in previous fiscal years, e.g., various safety improvements, secure voice capability and a modification to conserve fuel.

C-135 Modifications (F5, Line 34)

This program continues funding for 34 modifications to maintain the reliability and extend the service life of the C-135 fleet. Included are: continuation of Phase III Launch Control System for the EC-135 Airborne Launch Control Aircraft; wing reskinning; doppler replacement; a modification to improve fuel consumption; and the initiation of improvements to the Minimum Essential Emergency Communication Network.

E-3A (F5, Line 35)

Provides an airborne surveillance, command, control and communications system for use in both tactical and strategic defensive operations. This program includes both the production of new aircraft and the continuation of ongoing modification programs begun in prior fiscal years.

Other Aircraft Modifications (F5, Line 40)

These funds are required for previously initiated modifications e.g., modification to the Radar Warning Receiver Signal Processor; replacement of HF and VHF AM/FM radios; replacement of low and high altitude radar altimeters and other modifications on a variety of aircraft.

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Classified Projects (other aircraft modifications) (F5, Line 42)

Limited access program.

Civil Reserve Airlift Fleet (CRAF) (F5, Line 44)

Program funds incorporation of cargo convertibility features in U.S. wide-body passenger aircraft during initial production or as a retrofit to enhance intertheater aircraft capability without increasing Air Force aircraft inventory.

Spares and Repair Parts (Aircraft) (F5, Line 45)

Program provides for the initial procurement of weapon system spares, modification spares and common usage spares.

Common Ground Equipment (F6, Line 46)

Program provides for the procurement of organizational base and depot level support equipment for out-of-production aircraft and for common support equipment for new aircraft entering the inventory.

Industrial Facilities (F6, Line 47)

Program provides for capital type rehabilitation of real property at Air Force owned industrial facilities and finances preparation of government production equipment for shipment. Funds are used to bring Air Force plants to environmental standards, to reduce energy consumption and for improvements of manufacturing methods.

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War Consumables (F6, Line 48)

Provides additional wartime support required in the event of hostilities to sustain operations until production can be expanded.

Other Production Charges (F6, Line 49)

This program provides for items that are not directly related to specific aircraft procurement lines and cannot be reasonably allocated and charged thereto. It also includes items such as airborne electronic counter-measure pods that are used by more than one weapon system and managed as end items themselves.

NATO Airborne Warning and Control System (F6, Line 50)

This program provides the United States' share of acquisition, operation and support costs of the NATO AWACS program. This AWACS force will provide improved air defense and counter-air operations for NATO forces.

AIM-7F/M SPARROW (F9, Line 11)

Provides funds for procurement of SPARROW missiles. The SPARROW is a rocket-propelled, semi-active, radar guided, air-to-air missile. Provides US aircraft with an all-aspect capability under all-weather conditions against high performance air-to-air enemy aircraft.

AIM-9L/M SIDEWINDER (F9, Line 12)

Provides for procurement of SIDEWINDER missiles. The SIDEWINDER is an infrared, short-range, air-to-air missile designed

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for visual attack. The missile is carried by both Navy and Air Force fighter and attack aircraft for use against all enemy aircraft.

AGM-65D MAVERICK (F9, Line 14)

Provides for procurement of MAVERICK missiles. The MAVERICK missile is an air-to-ground system which incorporates infrared technology to provide an effective day-night-adverse weather weapon system.

AGM-88A HARM (F9, Line 15)

Provides for the initial procurement of HARM missiles for the Air Force. The HARM is an air-to-surface, anti-radiation missile designed to damage or suppress radar-directed air defense weapons.

RAPIER (F9, Line 16)

Continues procurement of the RAPIER air defense system. The RAPIER is a short-range, low-level, all-weather, ground-to-air missile system. Produced in the United Kingdom, it will be used to defend United States air bases in the UK.

Class IV (F9, Line 19)

Program will provide for modifications to improve reliability, maintainability, and extend service life of the AGM-45 SHRIKE, AIM-4 FALCON, LGM-30 MINUTEMAN and the Emergency Rocket Communications System. It will also initiate modifications to the BQM-34 Target Drone and update modifications to the Ground Launched Cruise Missile.

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Spares and Repair Parts (Missiles) (F10, Line 24)

Provides for procurement of initial and replenishment spares and repair parts for: ballistic missiles; other missiles; target drones; support, training, and replacement equipment; and spares for modification programs.

Satellite Data System (F10, Line 29)

A multi-purpose communication system which, with the Navy Fleet Satellite Communications Program, supports communications for strategic forces and between Air Force Satellite Control Facility ground stations.

Defense Meteorological Satellite Program (DMSP) (F10, Line 30)

DMSP is a satellite program which provides timely, high-quality visual and infrared weather data to support operations of the US Armed Forces. Funds will provide for satellite modifications and procure additional special sensors.

Defense Support Program (F10, Line 31)

DSP satellites contain sensors which provide near real-time data to National Command Authorities and other designated users.

Defense Satellite Communications System (DSCS) (F10, Line 32)

Provides super high frequency (SHF) satellite communications for secure voice and high data rate transmissions responsive to user requirements for command and control, communication intelligence data relay, early warning and space surveillance information, and diplomatic traffic. System consists of four operational and two

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on-orbit spare satellites. FY 1983 funds required to procure three production satellites.

Space Boosters

(F11, Line 35)

Program provides an austere Expendable Launch Vehicle (ELV) backup for the launch of critical USAF operational payloads in the event that the space shuttle program is delayed or the orbiter fleet is grounded. These funds complete two TITAN IIID vehicles and provide for the operation and maintenance of the ELV launch facilities.

Space Shuttle

(F11, Line 37)

Program funds procurement of an unmanned inertial upper stage (IUS) for the space shuttle and construction of launch facilities and resources for ensuring that NASA facilities meet DOD security requirements. The IUS will be used by both DOD and NASA.

Special Programs

(F11, Line 41)

Limited access programs.

Special Update Programs

(F11, Line 42)

Limited access programs.

30MM Training/HEI/API/Cartridges

(F13, Line 8-10)

Provides 30MM Training/HEI/API cartridges. 30MM is designed for use on the A-10 aircraft. Used with the GAU 8 gun system, the 30MM is effective against a broad spectrum of close air-support targets. System is specifically designed to defeat Soviet medium/heavy tanks.

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Laser Bomb Guidance Kit (F14, Line 20)

Kit consists of a field installed computer control group and an airfoil group for the MK-82, 83 and 84 bombs. Control group detects laser energy reflected from a target illuminated by either a ground or airborne laser target designator and directs the laser guided bomb on a line-of-sight trajectory to the target.

Tactical Air Control System Improvement (F19, Line 123)

Program provides tactical commanders with mobile communications and electronic equipment required to control deployed tactical forces.

Defense Support Program (F19, Line 125)

A continuing program which provides classified support to the National Command Authorities.

Minimally Attended Radar System (F19, Line 131)

Program to upgrade the Alaskan Air Command sensor capability with modern search radars. It will be capable of operating unattended up to five days.

Automatic Data Processing Equipment (F20, Line 138)

Program provides automatic data processing equipment necessary for the Air Force mission.

Air Base Defense System (F20, Line 144)

Program provides for increased security protection of alert aircraft and special weapon storage areas through procurement and deployment of physical security sensor systems.

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Range Improvement Equipment (F20, Line 147)

Provides instrumentation and equipment necessary to support the operational range mission. The primary function of this improved capability is to provide more effective tests, evaluation and training capability.

Joint Tactical Communications Program (TRI-T) (F21, Line 160)

Program funds a joint service effort to develop and acquire tactical communications equipment.

Training Support Equipment (F21, Line 173)

Program procures threat radar and early warning radar simulator systems for use on USAF operational test and training ranges and SAC strategic training ranges. Simulator systems provide a realistic combat environment for aircrew training and operational test and evaluation of weapons systems.

Spares and Repair Parts (Communications & Electronics) (F22, Line 179)

Provides funds for initial and replenishment spares and repair parts for Air Force communications and electronic equipment.

Base Procured Equipment (F23, Line 211)

Provides funds for local procurement of equipment that must be acquired directly from GSA, DLA, the other services, or commercial concerns.

Selected Activities (F24, Line 235)

Limited access activities.

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Special Update Program (F24, Line 236)

Limited access program.

DEFENSE AGENCIES (RDT&E)

Defense Research Sciences PE 61101E (D1, Line 1)

A DARPA program to explore new materials, processing, structures, and devise concepts and demonstrate innovative solutions for overcoming materials-related limitations or barriers to advancement in the capability of advanced bearings; rapid-solidification technology; improved propulsion engines; structural and optical components for space laser and surveillance systems; and for missile systems; electro-optical sensors; optical communication systems; high performance microelectronic circuits; infrared imaging focal planes; and special devices and materials for DOD application.

Tactical Technology PE 62702E (D1, Line 6)

A DARPA program dedicated to the development of advanced tactical technologies and concepts that will serve as the basis for development of the next generation of tactical systems. Program goal is to advance non-nuclear, tactical, combat capabilities with careful consideration to realistic costs and service manpower constraints.

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Integrated Command/Control Technology PE 62708E (D1, Line 9)

A DARPA program to develop advanced information processing, computer-communications and command system cybernetics technology which can provide the technology base for future command and control systems.

Defense Nuclear Agency PE 62715H (D1, Line 15)

Program provides for the development of nuclear weapons effects information necessary to evaluate survivability/vulnerability of United States military systems and understand/exploit weaknesses in enemy forces.

Cryptologic Activities PE 31011G (D2, Line 25)

Limited access program.

Communication Security PE 33401G (D2, Line 28)

Limited access program.

Defense Reconnaissance Support Activities PE 35159I (D2, Line 29)

Limited access program.

Tactical Cryptological Activities PE 35885G (D2, Line 30)

Limited access program.

WWMCCS Systems Engineer PE 320198 (D11, Line 20)

A DCA program which supports the worldwide Military Command and Control System which provides the National Command Authorities and Senior Military Commanders with essential information pertaining to the need for action by United States military forces and

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disseminates their decisions and orders to those forces.

DEFENSE AGENCIES (Procurement)

Classified Equipment (D2, Line 2)

Limited access program.

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DEPARTMENT OF ENERGY PROGRAMS

Activities related to these programs predominantly provide for normal maintenance and reliability assessment of the nuclear stockpile. Since these programs do not provide for additional warheads/bombs or for significant changes in characteristics or deployments, none of them are judged to have a significant impact on arms control policy or negotiations.

W71 -- A nuclear warhead developed for the SPARTAN, a long-range interceptor missile. The W71 has been deactivated and placed in a no-maintenance status in storage depots.

W70, Mods 1 and 2 -- A nuclear warhead developed for the LANCE, a mobile, surface-to-surface ballistic missile system.

W69 -- A nuclear warhead deployed in the AGM-69A Short-Range Attack Missile (SRAM) which was developed as a defense-suppression and stand-off missile for carriage on the B-52 and FB-111 aircraft.

W68 -- The nuclear warhead for the MK-3 re-entry body which is carried on the POSEIDON Fleet Ballistic Missile. Each missile has the capability of independently targeting multiple warheads.

W66 -- A nuclear warhead developed for the SPRINT, a short-range interceptor missile. The W66 has been deactivated and placed in a non-maintenance status in storage depots.

W62 -- A nuclear warhead deployed in a current MK-12 re-entry vehicle on the MINUTEMAN III missile. This system provides a multiple independently targetable re-entry vehicle (MIRV) capability.

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disseminates their decisions and orders to those forces.

DEFENSE AGENCIES (Procurement)

(D2, Line 2)

Classified Equipment

Limited access program.

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B61, Mods 0, 1, 2, 3, 4, 5 -- A lightweight, multi-purpose, aircraft-delivered, nuclear gravity bomb.

W58 -- The nuclear warhead for the MK-2 re-entry body, which is carried on the POLARIS A-3 ballistic missile.

B57 Bomb -- A lightweight, aircraft delivered, multi-purpose, nuclear depth charge or gravity bomb.

W56-4 -- A nuclear warhead for the MK-11 re-entry vehicle carried on the MINUTEMAN II ballistic missile.

W55 -- A nuclear warhead used with the Submarine Rocket (SUBROC), a rocket-propelled, nuclear depth bomb that is used against submarine targets.

W54 -- A nuclear warhead used in the Special Atomic Demolition Munition (SADM) application.

W53 -- A nuclear warhead designed to be used as a payload in the MK-6 re-entry vehicle for the TITAN II ICBM.

B53 -- A nuclear bomb designed to be delivered from a B-52 aircraft.

W50 -- A nuclear warhead used in MGM-31A and MGM-31B (PERSHING) field artillery missiles.

W48 155mm AFAP -- A nuclear warhead for the 155mm artillery-fired atomic projectile (AFAP).

W45-1 -- A warhead which provides a nuclear capability for the Navy's TERRIER surface-to-air guided missile, designed as anti-aircraft armament for guided missile cruisers and some aircraft carriers.

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W45-3,-4 Medium Atomic Demolition Munitions (MADM) -- A warhead which provides the Army with an atomic demolition munition.

W44 Depth Charge -- A nuclear warhead which is used with the anti-submarine rocket (ASROC) missile, providing surface combatant ships with a nuclear depth charge capability.

B43 -- A nuclear gravity bomb that can be delivered by most of the nuclear-capable strategic and tactical aircraft in the US inventory.

W33 8-inch AFAP -- A nuclear warhead for the Army 8-inch artillery-fired atomic projectile, fired from the M110 and M115 howitzers.

W31 -- A nuclear warhead for both the HONEST JOHN free-flight surface-to-surface missile and the NIKE HERCULES surface-to-air guided missile.

B28 -- A nuclear gravity bomb that can be delivered by a varity of aircraft in the US inventory.

W25 -- The nuclear warhead for the AIR-2A (GENIE) unguided air-to-air rocket designed for use against enemy aircraft.

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APPENDIX

Glossary of Pertinent Terms and Acronyms

ABM SYSTEM: A system to counter strategic ballistic missiles or their elements in flight trajectory, currently consisting of: 1) ABM interceptor missiles, which are interceptor missiles constructed and deployed for an ABM role, or of a type tested in an ABM mode; 2) ABM launchers, which are launchers constructed for launching ABM interceptor missiles; 3) ABM radars, which are radars constructed and deployed for an ABM role, or of a type tested in an ABM mode.

ABM TREATY: This Treaty is one of the two agreements signed at Moscow on May 26, 1972, known collectively as the SALT I agreements. The original ABM Treaty limited each side to two ABM deployment areas (one national capital area and one ICBM silo launcher area) with restrictions on the deployment of ABM launchers and interceptors (100 of each per area) and ABM radars at these areas. A protocol to the Treaty signed in 1974 further restricted each side to only one ABM deployment area.

ACCIDENTAL ATTACK: An unintended attack which occurs without deliberate national design as a direct result of a random event, such as a mechanical failure, a simple human error, or an unauthorized action by a subordinate.

ACCIDENTAL WAR: See ACCIDENTAL ATTACK.

ACCURACY OF FIRE: The measure of the deviation of fire from the aim point, expressed in terms of distance between the point of aim and the mean point of bursts.

ACTIVE DEFENSE: The employment of limited offensive action and counterattacks to deny a contested area or position of the enemy. (see also PASSIVE DEFENSE).

ACUTE DOSE: Total dose of radiation received at one time over a period so short that biological recovery cannot occur.

ACTIVE ELECTRONIC COUNTERMEASURES: ECM which involve active omissions which may be detected by an enemy such as jamming (the deliberate radiating or re-radiating of electronic signals in order to obliterate or obscure signals the enemy is attempting to receive) or deception (the deliberate radiating or re-radiating of electronic signals to mislead the enemy in his interpretation of signals received by his electronic equipment).

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AEROSPACE:	Of, or pertaining to, the earth's envelope of atmosphere and the space above it; two separate entities considered as a single realm for activity in launching, guidance and control of vehicles which will travel in both entities.
AEROSPACE DEFENSE:	All defensive measures designed to destroy attacking enemy aircraft, missiles and space vehicles after they leave the earth's surface, or to nullify or reduce the effectiveness of such attacks; an inclusive term encompassing air defense and space defense.
AGGREGATE:	The SALT II Agreement provides for several "aggregate" numerical limits on various categories of strategic offensive arms. The term "aggregate" refers principally to the overall aggragate of ICBM launchers, SLBM launchers, heavy bombers and ASBM's.
AIRBORNE ALERT:	A state of aircraft readiness wherein combat equipped aircraft are airborne and ready for immediate action. It is designed to reduce reaction time and to increase the survivability factor.
AIR-BREATHING of MISSILE:	A missile with an engine requiring the intake of air for combustion of its fuel, as in a ramjet or turbojet (To be contrasted with the rocket - powered missile, which carries its own oxidizer and can operate beyond the atmosphere).
AIRBURST:	An explosion of a bomb or projectile above the surface as distinguished from an explosion on contact with the surface or after penetration.
AIR DEFENSE:	All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack.
AIRLIFT:	The total weight of personnel and/or cargo that is, or can be carried by air, or that is offered for carriage by air. 2) to transport passengers and cargo by use of aircraft. (see also PAYLOAD)
AIR PORTABLE:	Denotes material which is suitable for transport by an aircraft loaded internally or externally with no more than minor dismantling and reassembling within the capabilities of user units. This term must be qualified to show the extent of air portability.

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AIR SUPERIORITY:	That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interferance by the opposing force.
AIR-TO-AIR MISSILE:	A missile launched from an airborne carrier at a targot above the surface.
AIR-TO-SURFACE MISSILE:	A missile launched from an airborne carrier to impact on a surface target.
ALERT:	1) Readiness for action, defense or protection. 2) A warning signal of a real or threatened danger, such as an air attack. 3) the period of time during which troops stand by in response to an alarm. 4) to forewarn; to prepare for action. (see also GROUND ALERT).
ALLOCATION:	The designation of specific numbers and types of aircraft sorties for use during a specified time period or for carrying out an assigned task. Allocation (nuclear): the apportionment of specific numbers and types of nuclear weapons to a commander for a stated time period as a planning factor for use in the development of war plans.
ANTI-RADIATION MISSILES:	A missile which homes passively on a radiation source.
ANTI-SUBMARINE WARFARE:	Operations conducted with the intention of denying the enemy the effective use of his submarines.
APOGEE:	The point at which a missile trajectory or a satellite orbit is farthest from the center of the gravitational field of the controlling body or bodies.
AREA DEFENSE:	Defense of a wide geographical area against missiles and aircraft.
AREA TARGET:	A target consisting of an area rather than a single point.
ARMING:	As applied to explosives, the changing from a safe condition to a state of readiness for initiation. As applied to weapons and ammunition, the changing from a safe condition to a state of readiness for initiation.

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ARMORED PERSONNEL CARRIER:	A lightly armored, highly mobile, full tracked vehicle, amphibious and airdropeble, used primarily for transporting personnel and their individual equipment during tactical operations. Production modifications or application of special kits permit use as a mortar carrier, command post, flame thrower, antiaircraft artillery chassis, or limited recovery vehicle.
ARMOR PIERCING (CAPPED):	Term applied to armour piercing projectiles which have a face hardened steel cap over the head.
ARMS CONTROL:	A concept which connotes: a) any plan, arrangement, or process, resting upon explicit or implicit international agreement, governing any aspect of the following: the numbers, types and performance characteristics of weapon systems (including their command and control, logistics support arrangements, and any related intelligence gathering mechanisms); and the numerical strength organization, equipment, deployment or employment of the armed forces retained by the parties. It encompasses "disarmament." b. On some occasions those measures taken for the purpose of reducing instability in the military environment.
ARMS STABILITY:	The condition of greater predictability and restraint which lessens the incentives for reactive force buildups.
ASSEMBLY AREA:	1). An area in which a command is assembled preparatory to further action. 2) In a supply installation, the gross area used for collection and combining components into complete units, kits or assemblies.
ASSURED DESTRUCTION:	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike.
ATTENUATION:	Decrease in intensity of a signal, beam, or wave as a result of absorption of energy and of scattering out of the path of a detector, but not including the reduction due to geometric spreading, i.e., the inverse square of distance effect. 2) In mine warfare, the reduction in intensity of an influence as distance from the source increases.
AVIONICS:	The application of electronics to aviation and astronautics.
AZIMUTH:	A direction expressed as a horizontal clockwise angle

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in degrees or mils measured from north. Azimuth resolution is the ability of radar equipment to separate two reflectors at similar ranges but different bearings from a vehicle. Normally the minimum separation distance between the reflectors is quoted and expressed as the angle subtended by the reflectors at the vehicle.

BACK-SCATTER/ BACKSCATTERING:	Radiowave propagation in which the direction of the incident and scattered waves, resolved along a reference direction (usually horizontal), are oppositely directed. A signal received by backscattering is often referred to as backscatter.
BALLISTIC MISSILE:	Any missile designed to follow the trajectory that results when it is acted upon predominantly by gravity and aerodynamic drag after thrust is terminated. Ballistic missiles typically operate outside the atmosphere for a substantial portion of their flight path and are unpowered during most of the flight. (see also INTERCONTINENTAL BALLISTIC MISSILE.
BALLISTIC TRAJECTORY:	The trajectory traced after the propulsive force is terminated and the body is acted upon only by gravity and aerodynamic drag.
BARRIER:	A coordinated series of obstacles designed or employed to canalize, direct, restrict, delay or stop the movement of an opposing force, and to impose additional losses in personnel, time and equipment on the opposing force.
BASE:	(air, land, sea, space). 1) A locality from which operations are projected or supported. 2) An area or locality containing installations which provide logistic or other support.
BATTLEFIELD SURVEILLANCE:	The continuous (all weather, day and night) systematic watch over the battle area to provide timely information for combat intelligence.
BEAM RIDER/ RIDING:	1. A missile guided by a radar, radio, or laser beam. 2. A missile guided by an electronic beam.
BILATERAL NEGOTIATION:	Negotiations between two countries.
BINARY NERVE GAS:	A process which provides for the formation of a lethal chemical agent from two non-lethal constituents by means of a chemical reaction occurring only during flight of the munition to a target. Additional safety and security are achieved by adding the second constituent at the time of preparing the munition for use.

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BIOLOGICAL WARFARE:	Employment of living organisms, toxic biological products and plant growth regulators to produce death or casualties in man, animals or plants; or defense against such action.
BLAST:	The brief and rapid movement of air vapor of fluid away from a center of outward pressure, as in an explosion or in the combustion of rocket fuel; the pressure accompanying this movement. This term is commonly used for "explosion," but the two terms may be distinguished.
BOMB DAMAGE ASSESSMENT:	The determination of the effect of all air attacks on targets (e.g., bombs, rockets, or strafe).
BOMBER (Light, Medium, Heavy):	1) Light: A bomber designed for a tactical operating radius of under 1,000 nautical miles at design gross weight and design bomb load. 2) Heavy: A bomber designed for a tactical operating radius over 2,500 nautical miles at design gross weight and design bomb load. 3) Medium: A bomber designed for a tactical operating radius of between 1,000 and 2,500 nautical miles at design gross weight and design bomb load.
BOOSTER:	1) A high explosive element sufficiently sensitive so as to be actuated by small explosive elements in a fuze or primer and powerful enough to cause detonation of the main explosive filling. 2) An auxiliary or initial propulsion system which travels with a missile or aircraft and which may or may not be separate from the parent craft when its impulse has been delivered. A booster system may contain or consist of one or more units.
BURNOUT:	The point in time or in the missile trajectory when combustion of fuels in the rocket engine is terminated by other than programmed cutoff.
CARRIER (Carrier Striking Force):	A naval task force composed of aircraft carriers and supporting combatant ships capable of conducting strike operations.
CENTRAL SYSTEM:	Offensive strategic nuclear weapons systems which the US considers central to the strategic nuclear relationship between the US and USSR (currently consisting of ICBMs, SLBMs, and heavy bombers).

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CHEMICAL AGENT:	A solid, liquid, or gas which, through its chemical properties, produces lethal or damaging effects on man, animals, plants or material, or produces a screening or signaling smoke.
CHEMICAL DEFENSE:	The methods, plans and procedures involved in establishing and executing defensive measures against attack by chemical agents.
CHEMICAL WARFARE (OPERATIONS):	Employment of chemical agents (excluding riot agents) to: a) kill, or incapacitate for a significant period of time, man or animals; and b) deny or hinder the use of areas, facilities, or material.
CHRONIC DOSE	Radiation dose absorbed in circumstances such that biological recovery may have been possible. It is arbitrarily accepted that a chronic dose can only mean absorption occurring after 24 hrs following the burst. (See also ACUTE DOSE).
CIRCULAR ERROR PROBABLE:	A measure of the delivery accuracy of a weapon system. It is the radius of a circle around a target of such size that a weapon aimed at the target has a 50% probability of falling within the circle.
CLEAN WEAPON:	A nuclear weapon in which measures have been taken to reduce the amount of residual radioactivity relative to a "normal" weapon of the same energy yield.
CLOSE AIR SUPPORT:	Air attacks against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces.
CLUSTER MUNITION:	1. Groups of bombs released together. A cluster usually consists of fragmentation or incendiary bombs. 2. (land mine warfare)-Component of a pattern laid minefield. It may be antitank, antipersonnel, or mixed. It consists of one to five mines and no more than one antitank mine.
COLD LAUNCH:	The technique of ejecting a missile from a silo before full ignition of the main engine, sometimes called "Pop-up."
COLD WAR:	A state of international tension, wherein political, economic, technological, sociological, psychological, paramilitary, and military measures short of overt armed conflict involving regular military forces are employed to achieve national objectives.

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COLLATERAL CASUALATIES & DAMAGE:	The damage to surrounding human and non-human resource either military or non-military, as the result of action or strikes directed specifically against enemy forces or military facilities.
COMMAND, CONTROL, COMMUNICATIONS:	The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of his mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures which are employed by a commander in planning, directing, cordinating and controlling forces and operations in the accomplishment of his mission.
COMMUNICATIONS SATELLITE:	An orbiting vehicle, which relays signals between communications stations. They are of two types: a. active communications satellite - A satellite which receives, regenerates, and retransmits signals between stations; and b. passive communications satellite - A satellite which reflects communications signals between stations.
CONTAMINATION:	The deposit and/or absorption of radioactive material, biological warfare agents or chemical warfare agents on and by structures, areas, personnel or objects.
CONTOUR FLYING:	Flight at low altitude in which the flight pattern conforms generally to the contours of the area. It is used to avoid observation or detection of an aircraft and/or the points to and from which it is flying.
CONTROLLED RESPONSE:	The selection from a wide variety of feasible options of the one which will provide the specific military response most advantageous in the circumstances.
CONVENTIONAL WEAPON:	Nonnuclear weapons. Excludes all biological weapons, and generally excludes chemical weapons except for existing smoke and incendiary agents, and agents of the riot control typo.
COOPERATIVE MEASURES:	Measures taken by one side in order to enhance the other side's ability to verify compliance with the provisions of the agreement. Such measures can be voluntary or negotiated.
COUNTERFORCE:	The employment of strategic air and missile forces in an effort to dostroy, or render impotent, selected military capabilities of an enamy force under any of the circumstances by which hostilitios may be initiated.

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COUPLING (STRATEGIC): The linking of a lower level conflict, e.g., Soviet/Warsaw Pact military aggression in Europe, to the use of US strategic deterrent forces such as ICBMs, heavy bombers and SLBMs.

CRISIS STABILITY: A strategic force relationship in which neither side has any incentive to initiate the use of strategic nuclear forces in a crisis situation.

CRUISE MISSILE: A guided missile which uses aerodynamic lift to offset gravity and propulsion to counteract drag. A cruise missile's flight path remains within the Earth's atmosphere.

CRUISE MISSILE CARRIER: An aircraft equipped for launching a cruise missile.

DAMAGE ASSESSMENT: 1) The determination of the effect of attacks on targets. 2) A determination of the effect of a compromise of classified information on the national security. 3) The appraisal of the effects of attacks on targets.

DATA LINK, RELAYS: A communications link whose terminals are suitable for transmission of data.

DECONTAMINATION: The process of making any person, object or area safe by absorbing, destroying, neutralizing, making harmless, or removing, chemical or biological agents, or by removing radioactive material clinging to or around it.

DECOY: A model, electromagnetic reflector or other device accompanying a nuclear weapon delivery vehicle in order to mislead enemy defensive systems so as to increase the probability of penetration and weapon delivery.

DEFENSE-IN-DEPTH: The siting of mutually supporting defense positions designed to absorb and progressively weaken attack, prevent initial observations of the whole position by the enemy and to allow the commander to maneuver his reserve.

DELIBERATE CONCEALMENT: Measures carried out deliberately to hinder or deliberately to impede verification of compliance with the provisions of the treaty. Deliberate concealment measures could include for example, camouflage, use of coverings, or deliberate denial of telemetric information, such as through the use of telemetry encryption, whenever such measures impede verification of compliance with the provisions of the agreement.

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DEMILITARIZED ZONE:	A defined area in which the stationing or concentrating of military forces, or the retention or establishment of military installation of any description, is prohibited.
DEPLOYMENT:	1) The extension or widening of the front of a military unit, extending from a close order to a battle formation. 2) In naval usage, the change from a cruising, approach or contact disposition to a disposition for battle. 3) In a strategic sense, the relocation of forces to desired areas of operation.
DEPRESSED TRAJECTORY:	The trajectory of a ballistic missile fired at an angle to the ground significantly lower than the angle of a minimum energy trajectory. Such a missile rises above the line-of-sight radar horizon at a later state of flight and has a shorter time of flight, thus making detection and tracking more difficult and reducing warning time.
DETERRENCE:	The prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction.
DOPPLER RADAR:	A radar system which differentiates between fixed and moving targets by detecting the apparent change in frequency of the reflected wave due to motion of target or the observer.
DRONE:	A land, sea or air vehicle which is remotely or automatically controlled.
DUAL-CAPABLE WEAPONS:	1) Weapons, weapons systems or vehicles capable of selective equipage with different types or mixes of armament or firepower. 2) Sometimes restricted to weapons capable of handling either nuclear or nonnuclear munitions.
DUAL-MISSION (PURPOSE) WEAPONS:	Weapons which possess the capability for effective application in two or more basically different military functions and/or levels of conflict.
EARLY WARNING:	Early notification of the launch, or approach, of unknown weapons or weapons carriers.
EARMARKED FOR ASSIGNMENT:	Forces which nations have agreed to assign to the operational command or operational control of a NATO/CENTO commander at some future date. In designating such forces, nations should specify when these forces will be available in terms agreed to in the echelon or category systems.

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ELECTROMAGNETIC PULSE: The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device in a surrounding medium. The resulting electric and magetic fields may couple with military systems to produce damaging current and voltage source.

ELECTRO-OPTICS: The interaction between optics and electronics leading to the transformation of electrical energy into light, or vice versa, with the use of an optical device.

ELECTRONIC COUNTERMEASURES: That major subdivision of electronic warfare involving actions taken to prevent or reduce the effectiveness of enemy equipment and tactics employing or affected by electromagnetic radiations and to exploit the enemy's use of such radiations.

ELECTRONIC WARFARE: That division of the military use of electronics involving actions taken to prevent or reduce an enemy's effective use of radiated electromagnetic energy, and actions taken to insure our own effective use of radiated electromagnetic energy.

ELECTRONIC JAMMING: The deliberate radiation, reradiation or reflection of electromagnetic energy with the object of impairing the use of electronic devices, equipment or systems being used by an enemy.

ENCRYPTION: Encryption is encoding communications for the purpose of concealing information. In SALT II, this term has been applied to a practice whereby a side alters the manner by which it transmits telemetry from a weapon being tested rendering the information deliberately undecipherable.

ENDOATMOSPHERE: From sea level to about 40 nautical miles altitude.

EQUIVALENT MEGATONNAGE: A measure used to compare the destructive potential of differing combinations of nuclear warhead yield against relatively soft countervalue targets. EMT is computed from the expression: $EMT=NY^x$, where N = number of actual warheads of yield Y; Y = yield of the actual warheads in megatons; and x = scaling

ESCALATION: An increase in scope or violence of a conflict, deliberate or unpremeditated.

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ESSENTIAL EQUIVALENCE:	The term as currently used refers to approximate equality in the overall strategic capabilities of the two sides' central systems.
EXOATMOSPHERE:	Higher than about 40 nautical miles above sea level.
EXPOSURE DOSE:	The exposure dose at a given point is a measurement of radiation in relation to its ability to produce ionization.
EXTERNALLY OBSERVABLE DIFFERENCES	Externally observable design features used to distinguish between those heavy bombers of current types [and air-launched cruise missiles] which are capable of performing a particular SALT-limited function and those which are not. These differences need not be functionally related but must be a physical design feature which is externally observable.
FALLOUT:	The precipitation to earth or radioactive particulate matter from a nuclear cloud; also applied to the particular matter itself.
FIREBALL:	The luminous sphere of hot gases which forms a few millionths of a second after detonation of a nuclear weapon and immediately starts expanding and cooling.
FIRE CONTROL:	All operations connected with the planning, preparation, and actual application of fire on a target.
FIRE CONTROL SYSTEM:	Group of interrelated fire control equipment and/or instruments designed for use with a weapon or group of identical weapons.
FIREPOWER:	The amount of fire which may be delivered by a position, unit or weapon system.
FIRST STRIKE:	The first offensive move of a war. (Generally associated with nuclear operations).
FISSION:	The process whereby the nucleus of a particular heavy element splits into (generally) two nuclei of lighter elements, with the release of substantial amounts of energy.
FIXED LAUNCHER: (ICBM):	There are two categories of ICBM launchers - fixed and mobile. Fixed ICBM launchers have traditionally been referred to as either "soft," whereby the missile and most of its launch equipment remain above ground, or "hard," whereby the missile and most of its launch

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equipment are contained in a hardened underground silo. In both cases the launcher - the equipment which launches the missile - is in a fixed location.

FLEXIBLE RESPONSE: The capability of military forces for effective reaction to any enemy threat or attack with actions appropriate and adaptable to the circumstances existing.

FOCAL PLANE: The plane, perpendicular to the optical axis of the lens, in which images of points in the object field of the lens are focused.

FORWARD BASED SYSTEMS: A term introduced by the USSR to refer to those US nuclear systems based in third countries or on aircraft carriers and capeble of delivering a nuclear strike against the territory of the USSR.

FORWARD DEFENSE POSITION: In the mobile defense, any combination of islands of resistance, strong points, and observation posts utilized by the defender to warn of impending attack, canalize the attacking forces into less favorable terrain and block or impede the attacking force. Forward defense positions are occupied by the minimum forces necessary while the bulk of the defending force is employed in offensive action.

FORWARD EDGE OF THE BATTLE AREA: (FEBA) The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating, designatad to coordinate fire support, the positioning of forces or the maneuver of units.

FRACTIONAL ORBITAL BOMBARDMENT SYSTEM: A missile that achieves an orbital trajectory, but fires a set of retro-rockets before the completion of one revolution in order to slow down, reenter the atmosphere and release the warhead it carries into a normal ballistic trajectory toward its target. While a normal ICBM follows a parabolic path to target, highly visible to defending radars, a weapon in low orbit, e.g., 100 miles, can make a sharp descent to earth, cutting radar warning time substantially. A FOBS path accordingly consists of a launch into low orbit, a partial circle to the earth target, and a rapid descent.

FRACTIONATION: The division of the payload of a missile into several warheads. The use of a MIRV payload is an example of fractionation.

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FUEL EXHAUSTION RANGE:	The total store of fuel assumed to be burned and no fuel reserve held back. Fuel exhaustion range is the range definition for cruise missiles in the SALT II Treaty.
FUNCTIONALLY RELATED OBSERVABLE DIFFERENCES: (FRODs)	The means by which SALT II provides for distinguishing between those aircraft which are capable of performing certain SALT-limited functions and those which are not. FRODs are differences in the observable features of airplanes which specifically determine whether or not these airplanes can perform the mission of a heavy bomber or whether or not they can perform the mission of a bomber equipped for cruise missiles of a range in excess of 600 km, or whether or not they can perform the mission of a bomber equipped for ASBMs.
FUSION:	The process accompanied by the release of tremendous amounts of energy, whereby the nuclei of light elements combine to form the nucleus of a heavier element.
GENERAL WAR:	Armed conflict between major powers in which the total resources of the belligerents are employed, and the national survival of a major belligerent is in jeopardy.
GLIDE BOMB:	A bomb fitted with air foils to provide lift, carried and released in the direction of a target by an airplane.
GROUND ALERT:	That status in which aircraft on the ground/deck are fully serviced and armed, with combat crews in readiness to take off within a specified short period of time (usually 15 minutes) after receipt of a mission order.
GROUND SUPPORT:	See CLOSE AIR SUPPORT.
GROUND ZERO:	The point on the surface of the earth at, or vertically below or above, the center of a planned or actual nuclear detonation. Also called GZ.
GUIDANCE:	The entire process by which target intelligence information received by the guided missile is used to effect proper flight control to cause timely direction changes for effective target interception.
GUIDED MISSILE:	An unmanned vehicle moving above the surface of the earth, whose trajectory or flight path is capable of being altered by an external or internal mechanism.

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HALF-LIFE: The time required for the activity of a given radioactive species to decrease to half of its initial value due to radioactive decay. The half-life is a characteristic property of each radioactive species and is independent of its amount or condition.

HARDENED SITE: A site constructed to withstand the blast and associated effects of a nuclear attack and likely to be protected against a chemical, biological, or radiological attack.

HEAVY BALLISTIC MISSILE: For the purpose of SALT II, ballistic missiles are divided into two categories according to their throw-weight and launch-weight: light and heavy. Heavy missiles (ICBM's, SLBM's, and ASBM's) are those missiles which have a launch-weight greater or a throw-weight greater than the launch-weight or throw-weight of the Soviet SS-19 ICBM.

HEIGHT OF BURST: 1) The vertical distance from the earth's surface or target to the point of burst. 2) For nuclear weapons, the optimum height of burst for a particular target (or area) is that at which it is estimated a weapon of a specific energy yield will produce a certain desired effect over the maximum possible area.

HIGH EXPLOSIVE: Generally applied to the bursting charges for bombs, projectiles, grenades, mines and demolition charges.

HOMING: The technique of tracking along a position line towards the point of origin of a radio, radar or other navigation aid.

HOMING GUIDANCE: A system by which a missile steers itself toward a target by means of a self-contained mechanism which is activated by some distinguishing characteristics of the target.

HOMING OVERLAY EXPERIMENT: (HOE) The HOE is designed to demonstrate the ability of optics to acquire targets in flight; isolate RVs from accompanying chaff, penetration aids, and booster fragments; and guide the missile to intercept with a goal of a miss distance small enough to permit RV destruction by other than nuclear means. HOE would demonstrate the capability and illustrate the advantages of exoatmosphere, non-nuclear intercept at relatively long ranges.

HOWITZER: A cannon which combines certain characteristics of guns and mortars. The howitzer delivers projectiles with medium velocities, either by low or high trajectories.

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HYPERGOBIC FUEL:	Fuel which will spontaneously ignite with an oxidizer, such as aniline with fuming nitric acid. It is used as the propulsion agent in certain missile systems.
ICBM SILO LAUNCHER:	An ICBM silo launcher, a "hard" fixed ICBM launcher, is an underground installation, constructed primarily of steel and concrete, housing an intercontinental ballistic missile and the equipment for launching it.
INDISCRIMINATE USE:	The placement of a munition which a) is not on, or directed against, a military objective; b) employs a method or means of delivery which cannot be directed at a specific military objective; or c) may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.
INDUCED RADIATION:	Radiation produced as a result of exposure to radioactive material, particularly the capture of neutrons.
INERTIAL CONFINEMENT:	A concept for attaining the density and temperature condition that will produce nuclear fusion by use of lasers or other high power sources to compress and heat small pellets containing fusionable fuel. The energy released is in the form of fast neutrons, X-rays, charged particles, and debris, and can be used in much the same way as the energy output of any other fusion (or fission) process.
INERTIAL GUIDANCE:	A guidance system designed to project a missile over a predetermined path, wherein the path of the missile is adjusted after launch by devices wholly within the missile and independent of outside information. The system measures and converts accelerations experienced to distance traveled in a certain direction.
INERTIAL NAVIGATION SYSTEM:	A guidance system designed to project a missile to a predetermined point on the earth's surfce by measuring acceleration and noting changes in any one direction. The system is insensitive to jamming, atmospheric conditions in the launcher area and other forms of interference.
INITIAL OPERATIONAL CAPABILITY: (IOC)	The date when the first combat missile unit is equipped, trained and logistic support established to permit performance of combat missions in the field. An initial operational capability date is associated with each new missile system as a target date for delivery of combat equipment, repair parts, maintenance equipment and publications plus supply of trained personnel.

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INITIAL RADIATION:	The radiation, essentially neutrons and gamma rays resulting from a nuclear burst and emitted from the fireball within one minute after burst.
INSPECTION:	In arms control, the physical process of determining compliance with arms control measures.
INTERCEPTOR:	A manned aircraft utilized for identification and/or engagement of airborne objects.
INTERCONTINENTAL BALLISTIC MISSILE: (ICBM)	A land-based fixed or mobile rocket-propelled vehicle capable of delivering a warhead to intercontinental ranges. Once they are outside the atmosphere, ICBMs fly to a target on an elliptical trajectory. An ICBM consists of a booster, one or more reentry vehicles, possibly penetration aids, and, in the case of a MIRV'ed missile, a post-boost vehicle. For the purposes of SALT II, an ICBM is considered to be a land-based ballistic missile capable of a range in excess of 5,500 km (about 3,000 nautical miles).
INTERDICT:	To prevent or hinder, by any means, enemy use of a route or area.
INTERFERENCE:	The SALT II treaty provides that each party shall use national technical means (NTM) of verification at its disposal to provide assurance of compliance with the treaty. In this connection, each party has undertaken a commitment not to interfere with the NTM of the other party. This means that neither side can destroy or attempt to negate the functioning of the NTM of the other side (e.g., blinding of photoreconnaissance satellites).
INTERMEDIATE RANGE BALLISTIC MISSILE:	A ballistic missile, with a range capability from about 1,500 to 3,000 nautical miles. See ICBM.
KILL PROBABLE (PROBABILITY):	A measure of the probability of destroying a target.
KILOTON WEAPON:	A nuclear weapon, the yield of which is measured in terms of thousands of tons of trinitrotoluene explosive equivalents, producing yields from 1 to 199 kilotons.
LAUNCH:	Transition from static repose to dynamic flight of a missile. For the purpose of SALT II, a launch includes a flight of a missile for testing, training, or any other purpose. The term "launch" would not encompass so-called pop-up tests which are tests of the launcher and ejection mechanism.

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LAUNCHER:	That equipment which launches a missile. ICBM launchers are land-based launchers which can be either fixed or mobile. SLBM launchers are the missile tubes on a ballistic missile submarine. An ASBM launcher is the carrier aircraft with associated equipment launchers for cruise missiles can be installed on aircraft, ships, or land-based vehicles or installations.
LAUNCHING SITE:	Any site or installation with the capability of launching missiles from surface-to-air or surface-to-surface.
LAUNCH-ON-WARNING:	A doctrine calling for the launch of ballistic missiles when a missile attack against them is detected and before the attacking warheads reach their targets.
LAUNCH PAD:	A concrete or other hard surface area on which a missile launcher is positioned.
LAUNCH WEIGHT:	The weight of the fully loaded missile itself at the time of launch. This would include the aggregate postboost vehicle (PBV) and the payload.
LIGHT (BALLISTIC MISSILE):	For the purposes of SALT II, ballistic missile are divided into two categories according to their throw-weight and launch-weight: light and heavy. The Soviet SS-19 ICBM is acknowledged by both sides as the heaviest of the existing light ICBM's on either side.
LINES OF COMMUNICATION:	All the routes, land, water, and air, which connect an operating military force with a base of operations and along which supplies and military forces move.
LOCK-ON:	Signifies that a tracking or target seeking system is continuously and automatically tracking a target in one or more coordinates (e.g., range, bearing, elevation).
LOGISTICS:	The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with: a. design and development, acquisition, storage, movement, distribution, maintenance, evacuation and disposition of materiel; b. movement, evacuation and hospitalization of personnel; c. acquisition or construction, maintenance, operation and disposition of facilities; and d. acquisition or furnishing of services.
MACH NUMBER:	The ratio of the velocity of a body to that of sound in the surrounding medium.

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MANEUVERABLE REENTRY VEHICLE:	A reentry vehicle capable of performing preplanned flight maneuvers during the reentry phase.
MAXIMUM RANGE:	The greatest distance a weapon can fire without consideration of dispersion, or the greatest distance a weapon system can fly.
MEDIAN LETHAL DOSE:	1. (Nuclear) The amount of radiation over the whole body which would be fatal to 50 percent of the animals or organisms in question in a given period of time. 2. (Chemical). The dose of toxic chemical agent which will kill 50 percent of exposed unprotected personnel. It is expressed in milligram minutes per cubic centimeter.
MEDIUM-RANGE BALLISTIC MISSILE:	A ballistic missile with a range capability from about 600 to 1,500 nautical miles.
MEGATON:	A unit of measurement for nuclear yield equivalent to the energy released from one million tons of TNT.
MIDCOURSE GUIDANCE:	The guidance applied to a missile between termination of the launching phase and the start of the terminal phase of flight.
MOBILE (ICBM) LAUNCHER:	Equipment which launches an ICBM and which can move or be moved from one location to another. Mobile ICBM launchers could include ICBM launchers on wheeled vehicles, launchers on vehicles which travel on rails, and launchers which are moved among launch-points which might themselves be "hard" or "soft."
MOBILITY:	A quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission.
MULTILATERAL NEGOTIATIONS:	Negotiations between more than two countries.
MULTIPLE INDEPENDENTLY-TARGETABLE REENTRY VEHICLE (MIRV)	Multiple reentry vehicles carried by a ballistic missile, each of which can be directed to a separate and arbitrarily located target. A MIRV'ed missile employs a post-boost vehicle (PBV) or other warhead dispensing mechanism. The dispensing and targeting mechanism maneuvers to achieve successive desired position and velocities to dispense each RV on a trajectory to attack the desired target, or the RV's might themselves maneuver toward their targets after they reenter the atmosphere.
MULTIPLE REENTRY VEHICLE:	The reentry vehicle of a ballistic missile equipped with multiple warheads where the missile does not have the capability of independently targeting the reentry vehicles - as distinct from a missile equipped for MIRV's.

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MUTUAL ASSURED DESTRUCTION: (MAD)	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike. MAD is a condition in which assured destruction capability is possessed by opposing sides.
MUTUAL BALANCED FORCE REDUCTIONS:	An on-going negotiation between NATO/Warsaw Pact countries on the reduction and limitation of military forces in central Europe. As presently structured, phase One of a negotiated agreement would involves force reductions between the US and USSR; Phase Two would involve reduction of force to a common collective ceiling of 700,000 ground troops or 900,000 ground and air units combined for each side.
MX (MISSILE EXPERIMENTAL):	A new US ICBM developed to replace the increasingly vulnerable ICBM force and designed to fit a mobile mode.
NATIONAL TECHNICAL MEANS: (NTM)	Assets which are under national control for monitoring compliance with the provision of an agreement. NTM include photographic reconnaisance satellites aircraft-based systems (such as radars and optical systems, as well as sea and ground-based systems such as radars and antennas for collecting telemetry).
REAR-REAL TIME (WARNING):	Delay caused by automated processing and display, between the occurrence of an event and reception of the data at some other location.
NIGHT/ADVERSE WEATHER:	Technological capabilities permitting devices or vehicles so equipped to operate in the dark or in non-clear daylight conditions.
NON-CIRCUMVENTION:	SALT II provides that each party undertakes not to circumvent the provisions of this treaty through any other state or states or in any other manner. This provision simply makes explicit the inherent obligation any state assumes when party to an international agreement not to circumvent the provisions of that agreement. This provision will not affect existing pattern of collaboration and cooperation with our allies, including cooperation in moderization of allied forces.
NORTH ATLANTIC TREATY ORGANIZATION NATO:	An organization, also known as the Atlantic Alliance, consisting of the signatories of the North Atlantic Treaty. Present members are Belguim, United Kingdom, Canada, Denmark, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Turkey, West Germany, and the US. France signed the Treaty but is no longer an effective member.
NUCLEAR AIRBURST:	The explosion of a nuclear weapon in the air, at height greater than the maximum radius of the fireball.

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NUCLEAR DAMAGE ASSESSMENT: The determination of the damage effect to the population, forces and resources resulting from actual nuclear attack. It is performed during the transattack and post-attack periods. It does not include the functions of evaluating the operational significance of nuclear damage assessments.

NUCLEAR DETONATION: An explosion resulting from fission and/or fusion reductions in nuclear materials, such as that from a nuclear weapon.

NUCLEAR RADIATION: Particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from the weapons standpoint, are alpha and beta peticles, gamma rays, and neutrons.

NUCLEAR SURFACE BURST: An explosion of a nuclear weapon at the surface of land or water; or above the surface, at a height less than the maximum redius of the fireball.

NUCLEAR WEAPON: A device in which the explosion results from the energy released by reactions involving atomic nuclei, either fission or fusion, or both.

NUCLEAR YIELD: The energy released in the detonation of a nuclear weapon, measured in terms of kilotons or megatons of trinitrotoluene required to produce the same energy release. Yields are categorized as:

- Very Low - less than 1 kiloton;
- Low - 1 kiloton to 10 kilotons;
- Medium - over 10 kilotons to 50 kilotons;
- High - over 50 kilotons to 500 kilotons;
- Very High - over 500 kilotons.

OBSERVABLE DIFFERENCES: See EXTERNALLY OBSERVABLE DIFFERENCES.

OPTICAL SCENE MATCHING CORRELATION: A form of terminal guidance on missles which can distinguish the target from ground clutter.

OPTIMUM HEIGHT: The height of an explosive which will produce the maximum effect against a given target.

ORBITAL (BOMB) INJECTION : The process of providing a space vehicle with sufficent velocity to establish an orbit.

OVER PRESSURE: The pressure resulting from the blast wave of an explosion. It is referred to as "positive" when it exceeds atmospheric pressure and "negative" during the passage of the wave when resulting pressures are less than atmospheric pressure.

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PASSIVE DEFENSE:	Measures taken to reduce the probability of, and to minimize the effects of, damage caused by hostile action without the intention of taking the initiative.
PASSIVE ELECTRONIC COUNTER-MEASURES	ECM without active transmission by the originator, such as intercept search for enemy electronic emissions and tactical evasion (measures taken to impede detection and tracking by the enemy).
PASSIVE HOMING GUIDANCE:	A system of homing guidance wherein the receiver in the missile utilizes radiations from the target.
PAYLOAD:	Weapons and pentration aids carried by a delivery vehicle. In the case of a ballistic missile, the RV(s) and antiballistic missile penetration aids placed on ballistic trajectories by the main propulsion stages or the PBV; in the case of a bomber, those bombs, missiles, or penaids carried internally or attached to the wing or fuselage.
PEAK OVERPRESSURE:	The maximum value of overpressure at a given location which is generally experienced at the instant the shock (or blast) wave reaches that location.
PENETRATION AIDS (ACTIVE & PASSIVE):	Devices employed by offensive weapon systems, such as ballistic missiles and bombers, to increase the probability of penetrating enemy defenses. They are frequently designed to simulate or to mask an aircraft or ballistic missile warhead in order to mislead enemy radar and/or divert defensive antiaricraft or antimissile fire.
PERIGEE:	The point at which a satellite orbit is the least distance from the center of the gravitational field of the controlling body or bodies.
POST-BOOST VEHICLE (PBV):	Often referred to as a "bus", the PBV is that part of a missile which carries the reentry and thrust devices for altering the ballistic flight path so that the reentry vehicles can be dispensed sequentially toward different targets (MIRVs). Ballistic missiles with single RV's also might use a PBV to increase the accuracy of the RV by placing it more precisely into the desired trajectory.
PRE-LAUNCH SURVIVABILITY:	The probability that a delivery and/or launch vehicle will survive an enemy attack under an established condition of warning.
PRE-EMPTIVE ATTACK:	An attack initiated on the basis of incontrovertible evidence that an enemy attack is immenent.
PRE-POSITION	To place military units, equipment or supplies

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at or near the point of planned use or at a designated location to reduce reaction time and to insure timely support of a specific force during initial phases of an operation; (POMCUS).

PROBABILITY OF DAMAGE:	The probability that damage will occur to a target expressed as a percentage or as a decimal.
PROCUREMENT:	The process of obtaining personnel, service, supplies and equipment.
PRODUCTION LEAD TIME:	The time interval between the placement of a contract and receipt into the supply system of material purchased. Two entries are provided: a. initial - the time interval if the item is not under production as of the date of contract placement. b. reorder - the time interval if the item is under production as of the date of contract placement.
PROJECTILE:	An object projected by an applied exterior force and continuing in motion, as a bullet, bomb, applied to rockets and to guided missiles.
PROLIFERATION (NUCLEAR WEAPONS):	The process by which one nation after another comes into possession of, or into the right to determine the use of nuclear weapons.
PROPELLANT:	That which provides the energy required for propelling a projectile. Specifically, an explosive charge for propelling a bullet, shell or the like; also a fuel, either solid or liquid, for propelling a rocket or missile.
PROPULSION TECHNOLOGY:	Technology related to: 1) reaction propulsion: propulsion system in which a forward motion or thrust is produced by the expulsion of propellant gases through nozzles or venturi, generally longitudinally opposed to the intended line of travel; 2) jet propulsion: reaction propulsion in which the propulsion unit obtains oxygen from the air as distinguished from rocket propulsion in which the unit carries its own oxygen producing material. In connection with aircraft propulsion, the term refers to a gasline or other fuel turbine jet unit which discharges hot gases through a tailpipe and a nozzle, affording a thrust which propels the aircraft.
PROTOCOL:	The SALT II agreement consists of three parts: a Treaty which will last through 1985, a Protocol which will last through 1981, and a Joint Statement of Principles and Basic Guidance for Subsequent

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Negotiations on the Limitation of Strategic Arms. The Protocol establishes temporary limitations on mobile ICBM launchers, ground and sea -launched cruise missiles, and ASBM's.

QUALITATIVE LIMITATION: Restrictions on capabilities of a weapon system as distinct from quantitative limits (e.g., on numbers of strategic delivery vehicles). In SALT II, such qualitative limits include, inter alia, a prohibition on more than one new type of ICBM for each side, restrictions on missile launch-weight and throw-weight, and limitations on the number of reentry vehicles a missile may carry.

QUANTITATIVE LIMITATION: Numerical limits on the number of weapons systems in certain categories, as distinct from qualitative limits on weapons capabilities. For the purposes of SALT II, such limitations include the various aggregate limits.

RADAR: Radio Detection And Ranging equipment that determines the distance and usually the direction of objects by transmission and return of electromagnetic energy.

RADIAC: A term used to designate various types of radiological measuring instruments or equipment. This term is derived from the words Radioactivity Detection, Indication And Computation and is normally used as an adjective.

RADIATION DOSE: The total amount of ionizing radiation absorbed by material or tissues, commonly expressed in rads.

RADIUS OF ACTION: The maximum distance a ship, aircraft or vehicle can travel away from its base along a given course with normal combat load and return without refueling allowing for all safety and operating factors.

RAMJET A jet propulsion engine containing neither compression nor turbine, which depends for it operation on the air compression accomplished by the forward motion of the engine.

RANGE: 1. The distance between any given point and an object or target. 2. Extent or distance limiting the operation or action of something, such as the range of an aircraft, ship or gun. 3. The distance which can be covered over a hard surface by a ground vehicle, with its rated payload, using the fuel in its tank and in cans normally carried as part of the ground vehicle equipment. 4. Area equipped for pratice in shooting at targets.

RAPID RELOAD CAPABILITY: The capability of a launcher to fire a second missile within a short period of time after an initial missile firing.

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REACTION TIME	1. The elapsed time between the initiation of an action and the required response. 2. The time required between the receipt of an order directing an operation and the arrival of the initial element of the force concerned in the designated area.
REAL-TIME	The absence of delay, except for the time required for the transmission by electromagnetic energy, between the occurrence of an event or the transmission of data, and the knowledge of the event, or reception of the data at some other location.
RECONNAISSANCE:	A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy; or to secure data concerning the meteorological, hydrographic or geographic characteristics of a particular area.
REDUCED BLAST/ ENHANCED RADIATION WEAPON (RB/ER):	A nuclear weapon designed to produce significantly more and/or higher energy output(s) of neutron, x-ray, gamma rays or a combination thereof than a normal weapon of the same total yield.
REENTRY VEHICLE (RV):	That portion of a ballistic missile which carries the nuclear warhead. It is called a reentry vehicle because it reenters the earth's atmosphere in the terminal portion of the missile trajectory.
RESIDUAL RADIATION:	Nuclear radiation caused by fallout, radioactive material dispersed artificially, or irradiation which results from a nuclear explosion and persists longer than one minute after burst.
ROCKET LAUNCHER:	Device such as a barrel, tube, rail or platform from which rockets and projected.
ROENTGEN:	A unit of exposure dose of gamma (or X-) radiation.
SAFEGUARD:	A ballistic missile defense primarily designed to protect our land-based retaliatory forces against direct attack, defend the American people against a nuclear attack, and protect the United States against a possible accidential launch or small attack. The principal subsystems are the Sprint and Spartan missiles, Missile Site Radar, Perimeter Acquisition Redar, and the Data Processing System.
SEA CONTROL OPERATIONS:	The employment of naval forces, supported by land and air forces, as appropriate, to achieve military objectives in vital sea areas. Such operations include destruction of enemy naval forces, suppression of

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enemy sea commerce, protection of vital sea lanes, and establishment of local military superiority in areas of naval operations.

SECOND-STRIKE:	The first counter blow of a war. Generally associated with nuclear operations.
SENSOR:	A technical means to extend man's natural senses; equipment which detects and indicates terrain configuration, the presence of military targets, and other natural and manmade objects and activities by means of energy emitted or reflected by such targets or objects. The energy may be nuclear, electromagnetic, including the visible and invisible portions of the spectrum, chemical, biological, thermal, or mechanical, including sound, blast, and earth vibration.
SHOCK WAVE:	The continuously propagated pressure formed by the blast from an explosion in air by the air blast, underwater by the water blast and underground by the earth blast.
SIDE LOOKING AIRBORNE RADAR (SLAR):	An airborne radar, viewing at right angles to the axis of the presentation of terrain or moving targets.
SLANT RANGE:	1. The line of sight distance between two points not at the same elevation. 2. Distance in a straight line from the center of a burst of a weapon at the instant of detonation (zero point) to a target. 3. Distance in a straight line from a gun, point of observation, or radar set to a target, especially an air target.
SOFTWARE:	A set of computer programs, procedures, rule and possibly associated documentation concerned with the operation of a data processing system, e.g., compilers, library routines, manuals, circuit diagrams.
SONAR:	A sonic device used primarily for the detection and location of underwater objects. (This term is devived from the words "Sound Navigation And Ranging")
SSBN:	See SUBMARINE.
STANDOFF:	1. As pertains to shaped charge ammunition: the distance of spacing between the base of the liner and the target at the time of initiation. 2. The desirable characteristic of a weapon system that permits the attacking aircraft to launch an attack on the target at a safe distance, usually outside the range of counterfire.

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STRATEGIC AIR WARFARE:	Air combat and supporting operations designed to effect, through the systematic application of force to a selected series of vital targets, the progressive destruction and disintegration of the enemy's warmaking capacity to a point where he no longer retains the ability or the will to wage war. Vital targets may include key manufacturing systems, sources of raw materials, critical material, stockpiles, power systems, transportation systems, communication facilities, concentrations of uncommitted elements of enemy armed forces, key agricultural areas, and other such target systems.
STRATEGIC INTELLIGENCE:	Intelligence which is required for the formation of policy and military plans at national and international levels.
STRATEGIC STABILITY:	The maintenance as far as possible of conditions such that neither the US nor the USSR would feel compelled to use its nuclear forces. (See ARMS STABILITY).
STRATEGIC WARNING:	A notification that enemy-initiated hostilities may be imminent. This notification may be received from minutes to hours to days or longer, prior to the initiation of hostilities.
STRATEGY:	The art and science of developing and using political economic, psychological and military forces as necessary during peace and war, to afford the maximum support to polices, in order to increase the probabilities and favorable consequences of victory and to lessen the chances of defeat.
SUB-KILOTON WEAPON:	A nuclear weapon producing a yield below one kiloton.
SUBMARINE (SSBN; SSB; SSN; SS; SSG; SSGN):	A warship designed for operations under the surface of the seas. Nuclear powered submarines contain the letter designation "N." USS nuclear-powered submarines which carry SLBMs are designated "SSBN." The US has 41 operational SSBNs with 16 launch tubes each; the TRIDENT SSBns will have 24 tubes. Soviet SSBNs include the H, Y, and D classes. Attack submarines, designated for launching cruise missiles are designated "SSGN" or "SSG" and include the Soviet S, W, P & C class submarines The Soviet long-range, diesel-powered ballistic missile submarines (Golf-class) are designated SSB.
SURFACE-TO-AIR MISSILE (SAM):	A surface-launched missile designed to operate against a target above the surface.
SURFACE-TO-SURFACE MISSILE (SSM):	A surface-launched missile designed to operate a target on the surface.

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SURVEILLANCE:	The systematic observation of aerospace, surface or subsurface areas, places, persons or things by visual, aural, electronic, photographic or other means.
TACTICAL:	Pertaining to the employment of units in combat or weapons designed for combat use.
TACTICAL NUCLEAR (FORCES, WEAPONS):	The use of nuclear weapons by land, sea or air forces against opposing forces, supporting installations or facilities, in support of operations, which contribute to the accomplishment of a military mission of limited scope, or in support of the military commander's scheme of maneuver, usually limited to the area of military operations.
TARGET ACQUISITION:	1. The detection, identification and location of a target in sufficient detail to permit the effective employment of weapons. 2. Process of positioning tracking apparatus of a weapon system so that a designated target is tracked.
TARGET DESIGNATION SYSTEM:	System for transmitting to one instrument the position of a target which has been located by another instrument.
TELEMETRY:	Refers to data, transmitted by radio to the personnel conducting a weapons test, which monitor the functions and performance during the course of the test.
TERMINAL GUIDANCE:	The guidance applied to a missile between mid-course guidance and its arrival in the vicinity of the target.
THEATER:	The geographical area outside the continental United States for which a commander of a unified or specified command has been assigned military responsibility.
THERMONUCLEAR WEAPON:	A weapon in which very high temperatures are used to bring about the fusion of light nuclear such as those of hydrogen isotopes (e.g., deuterium and tritium) with the accompanying release of energy. The high temperatures required are obtained by means of an atomic (fussion) explosion.
THROW-WEIGHT:	Ballistic missile throw-weight is the useful weight which is placed on a trajectory toward the target by the boost or main propulsion stages of the missile. For the purposes of SALT II, throw-weight is defined as the sum of the weight of: . the RV or RV's; . any PBV or similar device for releasing or targeting one or more RV's; and . Any antiballistic missile penetration aids, including aids, including their release devices.

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TIME-OF-FLIGHT: The time in seconds from the instant a projectile leaves the muzzle of a weapon or a missile leaves its platform, to the instant it strikes or bursts.

TRANSPONDER: A transmitter-receiver capable of accepting the electronic challenge of an interrogator and automatically transmitting an appropriate reply.

TURBOJET ENGINE: A jet engine whose air is supplied by a turbine driven compressor, the turbine being activated by exhaust gases.

UNACCEPTABLE DAMAGE: Degrees of destruction anticipated from an enemy second strike, which is sufficient to deter a nuclear power from launching a first strike. The degree of damage which will deter a first strike is a function, in part, of national value preferences and economic considerations and is therefore difficult or impossible to predict.

VERIFICATION: The process of determining, to the extent necessary to adequately safeguard national security, that the other side is complying with an agreement. This process of judging adequacy takes into account the monitoring capabilities of existing and future intelligence collection systems and analysis techniques and the ability of the other side to evade detection if it should attempt to do so. This process also assesses the political and military significance of potential violations and the costs, risks, and gains to a side of cheating.

VULNERABILITY: 1. The susceptibility of a nation or military force to any action by any means through which its war potential or combat effectiveness may be reduced or its will to fight diminished.
2. The characteristics of a system which causes it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of effects in unnatural (manmade) hostile environment.

WARHEAD: The part of a missile, projectile, torpedo, rocket, or other munition which contains either the nuclear or the thermonuclear system, high explosive system, chemical or biological agents or inert materials intended to inflict damage.

WAR RESERVES War reserves are stocks of material amassed in peacetime to meet the increase in military requirements consequent upon an outbreak of war. War reserves are intended to provide the interim suport essential to sustain operations until resupply can be effected.

WEAPON SYSTEMS: A weapon and those components required for its operation. (The term is not precise unless specific parameters are established).

YIELD: The energy released in an explosion. The energy released in the detonation of a nuclear weapon is generally measured in terms of the kilotons (KT) or megatons (MT) of TNT required to produce the same energy release.

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ACRONYMS

AAW	Anti-Air Warfare
ABM	Anti-Ballistic Missile
ABRES	Advanced Ballistic Reentry Systems
ABRV	Advanced Ballistic Re-entry Vehicle
ACR	Acoustic-Research Center
ADCU	Alternative Detection and Control Unit
ADSP	Advanced Digital Signal Process
AFAP	Artillery-Fired Atomic Projectile
AFSATCOM	Air Force Satellite Communications
AIR	Acoustic Intercept Receiver
AIRS	Advanced Inertial Reference Sphere
AIS	Advanced Isotope Separation
ALBM	Air Launched Ballistic Missile
ALCM	Air-Launched Cruise Missile
ALCS	Airborne Launch Control System
ALL	Airborne Laser Laboratory
ALPS	Alternate Launch Point System
AMaRV	Advanced Maneuvering Re-entry Vehicle
AMP	Aircraft Modernization Program
ANMCC	Alternate National Military Command Center
AP	Armour Piercing
APC	Armored Personnel Carrier
ARC	Acoustic Research Center
ARMS	Anti-Radiation Missions
ASALM	Advanced Strategic Air-Launched Missile
ASAT	Anti-Satellite
ASBM	Air-to-Surface Ballistic Missile
ASW	Anti-Submarine Warfare
ATA	Advanced Test Accelerator
ATBM	Anti-Tactical Ballistic Missile
ATGM	Anti-Tank Guided Munition
ATP	Advanced Technology Program
AWACS	Airborne Warning and Control System
BDA	Bomb Damage Assessment
BMD	Ballistic Missile Defense
BMEWS	Ballistic Missile Early Warning System
BR/CW	Biological Research/Chemical Warfare
BTH	Beyond-the-Horizon
BWC	Biological Weapons Convention
CAAM	Conventional Airfield Attack Missile
C/B/D	Chemical/Biological/Defense
C/BDT	Chemical/Biological Defense Technology
C^3 or CCC	Command, Control, and Communication
C^3I or CCCI	Command, Control, Communications and Intelligence
CD	Conference on Disarmament
CEP	Circular Error Probable
CL	Chemical-Laser
CLGP	Cannon-Launched Guided Projectile
CMCA	Cruise Missile Carrier Aircraft
CMP	Counter Military Potential

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CONUS	Continental United States
CSCE	Conference on Security and Cooperation in Europe
CSEDS	Combat Systems Engineering Development Site
CTB	Comprehensive Test Ban
CW	Chemical Warfare
CY	Calender Year
DARCOM	Development and Readiness Command
DARPA	Defense Advanced Research Projects Agency
DB	Decibels
DCT	Detection/Classification/Targeting
DCU	Detection Control Unit
DF	Deuterium Flouride
DOD	Department of Defense
DOE	Department of Energy
DPG	Dugway Proving Ground
DRE	Display Remoting Equipment
DSARC	Defense Systems Acquisition Review Council
DSPK	Double Shot Probability of Kill
DU	Depleted Uranium
ECCM	Electronic Counter-Counter Measure
ECM	Electronic Counter Measure
EDL	Electric Discharge Laser
ELF	Extremely Low Frequency
ELINT	Electronic Intelligence
EMCON	Emission Control
EMP	Electro-Magnetic Pulse
EMT	Equivalent Megatmorage
EP	Earth Penetrator
ERAM	Extended Range Anti Armor Mine
EUR	US European Command
FBM/IAP	Fleet Ballistic Missile/Improved Accuracy Program
FBMS	Fleet Ballistic Missile System
FBS	Forward Based Systems
FEBA	Forward Edge of the Battle Area
FLIR	Forward Looking Infrared
FMS	Foreign Military Sales
FOBS	Fractional Orbital Bombardment System
FRG	Federal Republic of Germany
FROD	Functionally Related Observable Difference
FROG	Free Rocket Over Ground
FUFO	Full Fuzing Option
FY	Fiscal Year
GDL	Gas Dynamic Laser
GEODSS	Ground-based Electro-Optical Deep Space Surveillance
GIN	Greenland, Iceland, Norway
GIUK	Greenland, Iceland, United Kingdom
GLCM	Ground-Launched Cruise Missile
GPS	Global Positioning System
GSRS	General Support Rocket System

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HE	High Explosive
HEL	High Energy lasers
HELTADS	High Energy Laser Tactical Air Defense
HELWS	High Energy Laser Weapon System
HEU	High Enriched Uranium
HF	Hydro-Fluoride
HOB	Height Of Burst
HOE	Homing Overlay Experiment
IAEA	International Atomic Energy Agency
IAP	Improved Accuracy Program
ICBM	Intercontinental Ballistic Missile
IFF	Identification Friend or Foe
IHE	Insensitive High Explosives
IOC	Initial Operational Capability
IONDS	Integrated Operational Nuclear Detection System
IR	Infrared
IRBM	Intermediate Range Ballistic Missile
IRT	Intermediate Range Technology
ITV	Instrumented Test Vehicle
IVA	Intermediate Volatility Agent
JDT	Joint Draft Text
JSS	Joint Surveillance System
JTIDS	Joint Tactical Information Distribution System
KM	Kilometer
KT	Kiloton
LADARS	Laser Radars
LANT	Atlantic Command
LoAD	Low Altitude Defense
LOW/LUA	Launch on Warning/Launch Under Attack
LRTNF	Long Range Theater Nuclear Forces
LWIR	Long Wave Infrared
MAD	Mutual Assured Destruction
MAPS	Multiple Aim Point System
MaRV	Maneuvering Re-entry Vehicle
MBFR	Mutual and Balanced Force Reductions
MBT	Main Battle Tank
MCCS	Multiple Code Coded Switch
MECs	Main Evaluation Centers
MEV	Million Electron Volts
MHV	Miniature Homing Vehicle
MIRACL	Mid-Infrared Advanced Chemical Laser
MIRV	Multiple Independently Targeted Re-entry Vehicle
MLIS	Molecular Laser Isotope Separation
MOU	Memorandum Of Understanding
MPS	Multiple Protective Shelter
MRASM	Medium-Range Air-to-Surface Missile
MRBM	Medium Range Ballistic Missile
MRV	Multiple Re-entry Vehicle
MSC	Military Sealift Command

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MSOR	Maximum System Operational Range
MSR	Missile Site Radar
MTU	Mobile Test Unit
MX	Missile Experimental
NATO	North Atlantic Treaty Organization
NAVFACS	Naval Shore Facilities
NAVSTAR	Navigation Satellite Timing and Ranging
NCA	National Command Authority
NDS	Navigation Development Satellite
NGA	NATO Guidelines Area
NM	Nautical Mile
NMCC	National Military Command Center
NNK	Non-Nuclear Kill
NORAD	North American Air Defense
NPT	Non-Proliferation Treaty
NSWP	Non-Soviet Warsaw Pact
NTM	National Technical Means
NTS	Navigation Technology Satellite
NUDETS	US Nuclear Detonation Warning System
OAS	Offensive Avionics System
OD	Observable Difference
OSD	Office of the Secretary of Defense
OTH	Over-The-Horizon
OTH-B	Over-The-Horizon Backscatter
OTH-T	Over-The-Horizon Targeting
PAC	Pacific Command
PAL	Permissive Action Link
PAR	Perimeter Acquisition Radar
PB	Particle Beam
PBV	Post Boost Vehicle
PBW	Particle Beam Weapon
PGM	Precision Guided Munitions
PGRV	Precision Guided Re-entry Vehicle
PI/DE	Positive Identification/Discrimination Equipment
PLSS	Precision Location Strike System
PNE	Peaceful Nuclear Explosion
POL	Petroleum, Oil, Lubrication
PSI	Pounds Per Square Inch
PSP	Plasma Separation Process
RADPG	Radar Area Coorelation Guidance
RAM	Radar Absorbing Material
RB/ER	Reduced Blast/Enhanced Radiation
RDT&E	Research, Development, Test, and Evaluation
REM	Rontgen Equivalent Man
RF	Radio Frequency
RPV	Remotely Piloted Vehicle
RV	Re-entry Vehicle
SAC	Strategic Air Command
SALT	Strategic Arms Limitation Treaty
SAM	Surface-to-Air Missile
SATCOM	Satellite Communications

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SATRACK	Satellite Missile Tracking System
SAWS	Submarine Acoustic Warfare Systems Project
SCC	Special Consultative Committee
SCUD	Soviet Tactical Missile
SE/AA	Strategic Warning and Attack Systems
SF	Standard Fission
SIGINT	Signal Intelligence
SINS	Ships Inertial Navigation System
SLBM	Submarine Launched Ballistic Missile
SLCM	Sea-Launched Cruise Missile
SLFCS	Survivable Low Frequency Communication System
SLOC	Sea Lines of Communication
SLTDP	Special Laser Technology Development Program
SNDV	Strategic Nuclear Delivery Vehicle
SNM	Special Nuclear Materials
SOSUS	Sound Surveillance System
SOTAS	Stand-Off Target Acquisition System
SPA	SOSUS Probability Area
SRAM	Short-Range Attack Missile
SRAT	Short-Range Applied Technology Program
SRBM	Short-Range Ballistic Missile
SSBN	Submarine Ballistic Nuclear
SSN	Nuclear-Powered Attack Submarine
SSPK	Single Shot Probability of Kill
STP	Systems Technology Program
SURTASS	Surface Towed Array Sensor System
TACAMO	Take Charge and Move Out
TAK	Navy Cargo Ship
TASM	TOMAHAWK Anti-Ship Missile
TEL	Transporter-Erector-Launcher
TERCOM	Terrain Contour Matching
TLAM/C	TOMAHAWK Land-Attack Missile/Conventional
TLAM/N	TOMAHAWK Land-Attack Missile/Nuclear
TNF	Theater Nuclear Forces
TNW	Theater Nuclear War
TREE	Transient Radiation Effects on Electronics
TTBT	Threshold Test Ban Treaty
UE	Unit Equipped
USAF	Unied States Air Force
USG	United States Government
VLF	Very Low Frequency
V/STOL	Vertical/Short Takeoff and Landing
WAAM	Wide Area Antiarmor Munition
WIC	Warning Information Correlation
WP	Warsaw Pact
WWMCCS	Worldwide Military Command and Control System

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98th Congress } JOINT COMMITTEE PRINT
1st Session }

[U.S. DEP]OSITORY
AUG 19 1983

FISCAL YEAR 1984 ARMS CONTROL IMPACT STATEMENTS

Statements Submitted to the Congress by the President Pursuant to Section 36 of the Arms Control and Disarmament Act

U.S. DEPOSITORY
AUG 19 1983

APRIL 1983

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FOREWORD

This volume contains the fiscal year 1984 arms control impact statements (ACIS) as submitted to the Congress by the Reagan administration in compliance with section 36 of the Arms Control and Disarmament Act.

This submission marks the eighth year in which arms control impact statements have been submitted to the Congress. This year, as in the past, it is hoped that the ACIS will enhance both executive branch and congressional decisionmaking regarding the potential impact of conventional, chemical, and nuclear programs on arms control policy and negotiations.

The fiscal year 1984 ACIS are of particular interest in light of the increasing congressional and public awareness of the importance of arms control as an integral component of U.S. national security policy. The timely submission of the fiscal year 1984 ACIS should enhance the ability of Congress to carefully scrutinize the fiscal year 1984 defense budget, which contains requests for the MX missile, the Trident submarine, the B–1 bomber, antisatellite systems, chemical weapons, and intermediate-range nuclear forces. These defense programs, as well as many others, are analyzed in the fiscal year 1984 ACIS.

A digest of the arms control impact statements prepared by the Congressional Research Service, and a glossary of pertinent terms and acronyms, are included, once again, in this year's joint committee print.

The Congress looks forward to future submissions of arms control impact statements which analyze for both the Congress and the executive branch the potential impact of defense programs on U.S. arms control policy and negotiations.

The views and analysis expressed in the following arms control impact statements are those of the executive branch and not necessarily those of the members of the House Committee on Foreign Affairs or the Senate Committee on Foreign Relations.

Clement J. Zablocki,
Chairman, Committee on Foreign Affairs.
Charles H. Percy,
Chairman, Committee on Foreign Relations.

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LETTER OF SUBMITTAL

U.S. ARMS CONTROL AND DISARMAMENT AGENCY,
OFFICE OF THE DIRECTOR,
Washington, D.C., January 31, 1983.

Hon. THOMAS P. O'NEILL, Jr.,
Speaker of the House of Representatives.
Hon. GEORGE BUSH,
President, U.S. Senate.

On behalf of the President, I am submitting the fiscal year 1984 arms control impact statements pursuant to 22 U.S.C. 2576, as amended. Classified and unclassified impact statements are submitted as required by the statute.[1] I am also submitting abbreviated statements for those programs that meet the statutory criteria for arms control impact statements but which have not received in-depth analysis for the reasons indicated.

The fiscal year 1984 budget cycle marks the eighth year in which arms control impact statements have been submitted to the Congress. As in previous submissions, some statements describe alternative points of view about arms control effects. The inclusion of any particular viewpoint, therefore, should not be understood to imply its endorsement.

The administration has concluded that all of the programs analyzed in the fiscal year 1984 budget are consistent with the terms and provisions of existing arms control agreements, with U.S. security and arms control policy, and with current negotiating positions.

Sincerely,

JAMES L. GEORGE,
Acting Director.

[1] The classified version is retained in committee files. This publication is the unclassified version in its entirety.

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CONTENTS

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CONGRESSIONAL RESEARCH SERVICE DIGEST OF FISCAL YEAR 1984 UNCLASSIFIED ARMS CONTROL IMPACT STATEMENTS*

INTRODUCTION

The arms control impact statements [ACIS] for fiscal year 1984 consist of 10 indepth documents and two compilations of abbreviated ACIS. Each indepth ACIS is organized into six sections: (1) Introduction; (2) program description; (3) stated military requirements; (4) funding; (5) analysis; and (6) summary and overall arms control assessment. The digests that follow were prepared from the unclassified versions provided to the Congress by the administration on January 31, 1983. These digests represent restatements of the language of each ACIS and do not reflect the views of the Congressional Research Service or the Congress. Information beyond the scope of these digests is available in the unclassified ACIS published in this volume. The most complete information, of course, is available in the classified ACIS.

ICBM PROGRAMS

Maintaining and improving the capabilities of the U.S. land-based ICBM force includes, for the Minuteman squadrons, improving survivability, replacing the current reentry vehicle for greater yield and accuracy, improving the command, control, and communications systems, and completing production of the W78 warhead. For the MX program, the missile booster, guidance and control systems, postboost vehicle, and reentry system are being developed, tested, and integrated into a missile system. The advanced strategic missile systems program develops ballistic missile systems, subsystem, reentry and penetration aid for existing and future ICBM's, IRBM's, and SLBM's. All of these improvements contribute to the extreme flexibility of the U.S. land-based missile force which will enable it to continue to make a major contribution to the deterrent posture of the United States. The following arms control implications have been taken into consideration:

—Production and deployment of MX will result in a more secure and stable strategic deterrent force and create incentives for the Soviets to enter into meaningful arms reduction negotiations, because a wide range of Soviet military targets will have been placed at risk.

—Development of MX and Minuteman improvements are consistent with the provisions of SALT I, which permitted modernization and replacement of strategic ballistic missile systems, precluded construction of new fixed land-based ICBM launchers, but did not limit development of new missiles for fixed or mobile launchers.

*Prepared by Dagnija A. Sterste-Perkins, Analyst in International Relations, Foreign Affairs and National Defense Division, Congressional Research Service.

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—The provisions of SALT II are not violated by U.S. programs. Deployment of MX would not prevent us from meeting the launcher limits since less capable systems could be retired. In addition, MX will be the only new ICBM type (limited to one by SALT II) flight-tested and deployed by the United States in the foreseeable future.

—Neither SALT I nor SALT II provides a definition of a fixed ICBM launcher, though both prohibit parties from starting "construction of additional fixed ICBM launchers." Deployment of MX in canisters would not entail construction of new fixed launchers in the strict SALT sense, because all essential launch equipment would be included in the canister (not as an integral part of the silo as in current fixed ICBM's) and the canister with the missile would be transportable; such a basing mode thus would be a new concept for land-based ICBM deployment and would not undercut either SALT Agreement.

—A viable ABM defense of U.S. ICBM's could improve ICBM survivability and is under study as an element of a long-term option for maintaining the survivability of MX.

—The President's May 9, 1982 START proposal attempts to reduce the threat of nuclear war by enhancing deterrence and securing a stable nuclear balance, the main threat to which has been the Soviet buildup of strategic ballistic missiles forces. MX is fully compatible with the U.S. START proposal, and lends itself to flexible force sizing. The number of missiles eventually deployed is uncertain, depending on the size and character of projected threats and strategic force targeting requirements.

—Overall, the effect of U.S. ICBM programs on stability is positive. The impact of MX on "arms race stability"—a condition of predictability and restraint which lessens the incentives for reactive force buildups—will be largely determined by Soviet interpretation of MX's effect on vulnerability of both sides' land-based strategic forces. MX will increase Soviet ICBM vulnerability and a secure MX deployment mode will enhance U.S. ICBM survivability. The Soviets might conclude that reduction of their ICBM's would be suitable if they perceive MX to be vulnerable even by a reduced ICBM force, or if MX is perceived as so invulnerable that additional targeting would not be warranted (assuming, in both cases, that Soviet vulnerability was also reduced by mobility, deceptive basing, or ballistic missile defense [BMD]). The U.S.S.R. could reject reductions as being too constraining if MX is perceived as vulnerable enough to warrant countermeasures but still so invulnerable as to require large Soviet prompt hard-target-kill forces—especially in the near term, if the U.S.S.R. did not anticipate rapid development of a counter to the threat posed by MX to their existing fixed-based ICBM's.

—MX will primarily threaten Soviet SS–18 and SS–19 ICBM's, those missiles mainly responsible for the imbalance in prompt hard-target-kill capability. Thus, MX deployment should provide incentive for Soviet efforts to lessen the vulnerability of their land-based ICBM's.

—Implementation of the U.S. strategic modernization program together with agreement to the U.S. START proposals could

significantly enhance stability and deterrence by lessening the Soviet incentive to use or threaten to use military force, to the extent that the U.S.S.R. recognizes that any nuclear attack would not destroy the U.S. forces and C^3 necessary for us to respond against both remaining Soviet nuclear capabilities, and against the Soviet conventional forces essential to achieve any lasting military, political, and economic gain from a preemptive nuclear attack.

—Reducing the number of prospective targets through survivable MX basing will remove one of the primary Soviet incentives for maintaining a preemptive threat.

—Failure to deploy MX would have political repercussions, also, and could lead to perceptions of Soviet advantage with the following implications: greater Soviet freedom of action in the employment of conventional forces; greater Soviet latitude in using nuclear strength for political coercion; development of new perceptions of relative United States and Soviet strength among third countries; and an adverse effect on Allied willingness to deploy GLCM and Pershing II in Europe.

—MX could affect regional stability by demonstrating to U.S. allies that the United States is committed to pursuing strategic equivalency with the Soviet Union; the Allies' perceptions of U.S. determination to prevent strategic force asymmetries from providing advantages to the U.S.S.R. would be strengthened.

—U.S. deployment of systems significantly improving missile accuracy or pursuit of technology programs providing even greater accuracies could stimulate continued competition with the Soviet Union. However, Soviet ICBM accuracy has significantly progressed recently and the Soviets have tended to stress development in areas driven by their military requirements rather than in reaction to U.S. program developments.

—Deployment of a mobile ICBM, particularly a Soviet mobile ICBM, could raise verification problems, since the different intelligence-gathering environments in the two countries would make it more difficult for the United States to monitor compliance. Increased capabilities of each side's strategic forces place increased burdens on monitoring capabilities, although such obstacles can be reduced by negotiated agreement and cooperative measures if both sides desire to do so.

SSBN/SLBM Programs

The Trident submarine, missile, and warhead programs provide a new class of fleet ballistic missile submarines and associated SLBM's to augment and eventually replace the present Poseidon submarines. (All 10 Polaris submarines have been withdrawn from the strategic force.) They have the peacetime mission of deterrence of nuclear war, and the wartime missions of strategic and theater nuclear strikes, as well as deterrence of further escalation. The ultimate size of the Trident submarine force has not been determined and will depend on many factors, including (*a*) assessments of the size and capability of Soviet strategic and antisubmarine warfare [ASW] forces; and (*b*)

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possible ceilings on strategic forces negotiated in strategic arms reductions negotiations.

—SSBN/SLBM systems, while at sea, are highly survivable elements of U.S. strategic forces and thus provide an important and credible element to our nuclear deterrent. Modernization of the U.S. sea-based strategic forces is consistent with the U.S. policy of restoring the strategic balance, enhancing stability through survivability, and creating incentives for the Soviets to enter into meaningful negotiations for arms limitation treaties.

—Under the terms of the expired SALT I agreement, the United States has dismantled three older Polaris submarines to compensate for launchers on new Delta and Typhoon SSBN's in dismantled launchers on older ballistic missile submarines to compensate for launchers on new Delta and Typhoon SSBN's in order to meet these restrictions.

—Unlike the SALT I Interim Agreement, there were no separate limits on numbers of ballistic missile submarines under SALT II. The United States is below the 2,400 aggregate ceiling on launchers and the other subceilings. The transfer of weapons systems numerically limited by SALT II was not precluded by the agreement; the United States plans to sell to the United Kingdom sufficient MIRV'd missiles to maintain a force of four to five new British built submarines that would replace the existing British Polaris sea-based strategic missile force in the early 1990's.

—With respect to the NPT, unilateral U.S. nuclear modernization restraint would not eliminate criticism from nonnuclear weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Such unilateral restraint would weaken the credibility of the U.S. deterrent for those countries that rely on the U.S. nuclear umbrella.

—The Trident SSBN/SLBM programs could be constrained by the Threshold Test Ban Treaty; Soviet observance of the 150KT limit is in question, as is U.S. ability to verify Soviet observance.

—The Trident programs will assure that the United States continues to maintain a credible, survivable sea-based strategic retaliatory force, even taking into account foreseeable developments in Soviet ASW capabilities. The more capable Trident II missiles will help, in the 1990's, to compensate for the declining number of submarines as older Poseidon submarines are retired. The greater range of Trident missiles produces a far greater ocean operating area for U.S. strategic submarines. This, combined with greater speed and quietness, will make Trident even more survivable against Soviet ASW forces. No impending Soviet ASW development appears likely to pose a significant threat to Trident.

—Increased confidence of U.S. allies in the readiness and ability of the United States to react to the modernization of Soviet strategic systems will prevent the U.S.S.R. from obtaining a perceived or real strategic advantage.

—In the future, U.S. SSBN's could come to assume increasing importance in guaranteeing the secure U.S. retaliatory capability necessary to deter nuclear attack on the United States or its allies; hence, these programs are essential to U.S. security and to strategic stability.

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—Deployment of Trident II and other systems with hard-target-kill capabilities could add incentives for the Soviets to reduce their ICBM vulnerability; for example, by deploying more of their capability at sea, or on mobile ICBM's, thereby enhancing strategic and crisis stability. Soviet reaction would depend on factors such as the speed of the U.S. deployment, the cost of such changes to them, and the degree to which they perceived their silo-based ICBM's to be threatened.

—These programs should cause no verification problems. Although SSBN's and SLBM launchers are concealed for a part of their life, they periodically emerge and provide opportunities to confirm existing operating numbers. This can be accomplished by Soviet NTM.

AIRBORNE STRATEGIC OFFENSIVE SYSTEMS

Modernization of the airborne component of U.S. strategic forces will maintain the effectiveness and credibility of the U.S. strategic nuclear deterrent. Transforming the B–52 force from a pure penetration to a cruise missile launch mission will maintain its combat effectiveness against projected enemy threats of the 1980's. The ALCM will present Soviet air defenses with a more diversified threat, thereby preventing the Soviets from concentrating their resources on any one system. The B–1B bomber, with its high penetration speed, low-altitude terrain clearing flight, reduced radar cross-section and advanced electronic countermeasures will provide a flexible, large-payload delivery aircraft capable of penetrating Soviet defenses well into the 1990's. An advanced technology bomber, planned for deployment in the early 1990's, will be capable of penetrating all existing and projected Soviet air defenses until well past the turn of the century.

—The United States intends to rely on a mixed force of penetrating bombers and standoff bombers with cruise missiles to maintain the effectiveness of the air-breathing forces against future Soviet air defenses, which are not limited by current arms control agreements. Modernization of the bomber element of the strategic Triad will establish a deterrent that is more secure and stable than exists today and could provide the incentives necessary for the Soviets to respond seriously to proposals for equitable and verifiable reductions in arms.

—According to the second agreed statement to article IV.14 of SALT II, no bomber of the B–52 or B–1 types and no bomber of the TU–95 or Myasischev types would be equipped for more than 20 cruise missiles capable of a range in excess of 600 km.

—The May 9, 1982, U.S. START proposal does not include specific limits on bombers and cruise missiles but the United States has indicated that such limits could be included in the second phase.

—Since bombers and ALCM's take at least several hours after take-off to deliver their weapons on target, such forces clearly are not a first-strike threat against the Soviet Union. Their considerable retaliatory capability enhances deterrence, while their slowness of delivery makes them inappropriate for use in any attack against time-urgent targets in the Soviet Union. Therefore, they contribute to crisis stability.

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—The U.S. lead over the Soviet Union in ALCM technology is 5 or more years. If they believed it necessary, the Soviets could respond to U.S. ALCM deployment by (1) increasing efforts to deploy a defense against ALCM's and their associated launch platforms; (2) accelerating their own ALCM program; (3) upgrading their overall existing strategic offensive systems.

—Cruise missiles raise difficult verification problems, especially over the longer term. Each side would have to overcome difficult problems in order to be able to determine the particular fuel exhaustion range, payload, and launch platform of a given cruise missile. To the degree that such elements are or become the subject of constraints under arms control agreements, verification would become more complicated and more detailed and stringent cooperative measures will be required in order to assure adequate verification. The open U.S. society, in contrast to that of the Soviet Union, affords the Soviets considerable advantages in monitoring ALCM development, production, and deployment.

SPACE DEFENSE

The purpose of the U.S. space defense program is to insure the capability of the United States to defend its assets in space and to deny the Soviets the uninhibited use of space. Programs to accomplish this comprise four main functional areas: (1) antisatellite [ASAT] systems; (2) space systems survivability; (3) space surveillance systems; and (4) command and control. The U.S. ability to utilize its military power continues to be increasingly dependent on the effective and reliable operation of various satellite systems; the Soviet Union is also expected to be increasingly dependent on satellites. The Soviet Union possesses an operational ASAT system, while the United States currently does not.

The Air Force ASAT system will provide a capability to negate low-altitude Soviet military satellites that directly support Soviet combat forces, and will give the United States a capability to deny unilateral Soviet control of space. Posing such a threat to Soviet satellites could help deter Soviet use of ASAT systems against U.S. satellites in some situations, such as limited war, in which such Soviet activity might be a real risk.

—As part of the national space policy announced by the President on July 4, 1982, U.S. study of space arms control options will continue. The United States will consider verifiable and equitable arms control measures that would ban or otherwise limit testing and deployment of specific weapon systems, should those measures be compatible with U.S. national security. Current space defense programs are consistent with these goals.

—The Soviets enjoy the advantage of an ASAT system which has been tested and operational for a period of time. In the absence of a comparable U.S. system or some form of negotiated mutual limits, the Soviet ASAT program provides them with a unilateral military advantage which could be detrimental to the United States, even with improved survivability for U.S. satellites.

—The U.S. space defense program is consistent with international obligations under the terms of the Outer Space Treaty, the Lim-

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ited Test Ban Treaty, the ABM Treaty, the Direct Communications Link Improvement Agreement, the U.N. Charter, and the Convention on Registration of Objects Launched Into Outer Space.

—The U.S.-U.S.S.R. joint communique issued in Vienna in June 1979, after a year of bilateral ASAT talks, stated that the sides "agreed to continue actively searching for a mutually acceptable agreement in the continuing negotiations on ASAT systems," but since the Soviet invasion of Afghanistan, no further talks have been held.

—The definition of what comprises an ASAT system could have a bearing on several U.S. space programs, to the extent that constraints on ASAT's might be inferred to apply to other elements of the U.S. space program.

—A Soviet advantage in ASAT capability could contribute to strategic and regional instability. ASAT weapons could pose a considerable threat to critical satellites on both sides, creating a situation in which neither side could rely with confidence on unprotected space systems to provide reconnaissance of foreign forces, navigational data, or other necessary forms of support.

—Soviet ASAT programs are driven by their national security requirements; but, depending on their perceptions of U.S. ASAT developments, they might see it in their interests to seek some type of ASAT limitations.

Ballistic Missile Defense

The U.S. ballistic missile defense research and development program, conducted within the constraints of the Anti-Ballistic Missile [ABM] Treaty, is aimed at building the technological base to provide a wide range of options for possible strategic defense applications including the definition and demonstration of the defended options for MX basing included in the President's strategic modernization program. The program aims to reduce the cost and the system development lead time, as well as improving the effectiveness of systems applicable to ICBM defense. It thus allows the United States to keep abreast of advances in BMD technology while providing a hedge against possible Soviet ABM breakout. The current U.S. effort in this area is largely motivated by the threat posed by growing Soviet ICBM countersilo capabilities and the U.S.S.R.'s own continuing BMD development activities.

—By hedging against Soviet breakout from the ABM Treaty, the U.S. program serves to discourage such breakout and contributes to the continued viability of the treaty. It also provides a base of expertise for evaluating the costs and benefits of further system deployment options created by new or improved BMD technology should the United States conclude that deployment would be in its interest.

—Absent the U.S. BMD program, the prospects for Soviet advantage in BMD technology, or perceptions of Soviet advantage, could be increased with attendant negative implications for global and regional stability.

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—The fiscal year 1984 BMD program has no perceptible effect on such issues as the nuclear threshold, crisis stability, escalation, collateral damage, and aftermath effects, or the risk of accidental war, and hence is not destabilizing on any of these grounds.
—The ability to deploy an effective BMD system could convince a potential attacker that any offensive buildup designed to produce a disarming first-strike capability against ICBM's would be pointless. Also, BMD deployments could stimulate the development and deployment of advanced penetration aids and maneuvering reentry vehicles for United States and Soviet forces, as well as increases in force levels.
—Expertise accumulated through our own BMD program could assist the United States in its efforts to assess Soviet BMD activities, thereby having a positive effect on verification.

Sea-Launched Cruise Missile

The Tomahawk sea-launched cruise missile [SLCM] is being developed with a conventional and nuclear capability for land-attack and a conventional capability for ship-attack, to satisfy U.S. requirements worldwide. The missile is capable of being deployed aboard a variety of surface ships and submarines in several launch configurations. As part of the strategic modernization program, nuclear land-attack SLCM would provide a survivable, credible, and effective military option on a worldwide basis to strike selected naval and other fixed targets ashore and to contribute to a strategic reserve in support of national policy. Upgrading the Navy's current nuclear land-attack force will provide (*a*) a means of bringing nuclear forces to bear in areas of the world where they are not forward deployed ashore; (*b*) a mobile nuclear reserve to augment land-based systems; and (*c*) a contribution to a postexchange reserve force.

—The SLCM program is consistent with the U.S. policy of restoring the strategic balance, enhancing stability through increased survivability, and creating incentives for the Soviets to enter meaningful negotiations for arms reduction treaties.
—The SALT II protocol, which would have expired December 31, 1981, would have prohibited deployment of cruise missiles capable of ranges in excess of 600 km. on ground- and sea-based launchers. But development and testing of such cruise missiles was permitted if they were not equipped with multiple independently targetable warheads. Thus, SLCM was not impeded by the protocol, since it will not have multiple independently targetable warheads.
—With regard to the INF talks, it is the U.S. position that sea-based systems should not be included in an INF agreement.
—SLCM's impact on stability is partly a function of cruise missile characteristics. SLCM will provide an improved capability to bring nuclear forces to bear in areas where they are not forward deployed ashore, and provide a hedge against Soviet preemption of land-based systems. Thus, their deployment could strengthen regional and global stability. In addition, SLCM's range, flight time, and survivability affect stability and deterrence.
—The variety and number of potential launch platforms also affect SLCM's impact on stability. From the U.S. perspective, the large number of available launch platforms complicates the Soviet tar-

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geting problem and should increase system survivability and hence deterrence.

—The cruise missile represents a potent nuclear system which is highly mobile and difficult to detect. From the Soviet perspective, the problem is compounded by the fact that Tomahawk cruise missiles will be deployed on many different platforms, thereby making it difficult to negate U.S. retaliatory capabilities. Thus, the Soviets could become more willing to engage in substantive arms control negotiations which could limit such systems.

—SLCM, while conveying to the Soviet Union that its territory is a sanctuary, also threatens important reserves, supplies, and other supports for Warsaw Pact forces, thus complementing other nonstrategic nuclear systems. The range of options resulting from conventional, nonstrategic, and strategic nuclear forces provides some possibility of controlling escalation and stopping conflict at the lowest level possible should deterrence fail. SLCM's increased survivability might allow the West to put relatively less dependence on aircraft for the delivery of nuclear weapons, thereby releasing some aircraft for conventional roles.

—Verification could be complicated by such characteristics of cruise missiles as range, payload, and missile types and missions.

—The effect of U.S. modernization programs on current prospective arms control negotiations has already been demonstrated in the INF talks. It was not until faced with the prospect of Pershing II and GLSM deployments that the Soviet Union displayed a willingness to engage in substantive arms control negotiations.

Intermediate-Range Nuclear Forces

There have been no significant programmatic changes in either the Pershing II or ground-launched cruise missile [GLCM] programs since the submission of the fiscal year 1983 ACIS. Discussion of these programs is included because of the high degree of interest in "longer-range Intermediate-Range Nuclear Forces" [LRINF] here and in Europe.

—LRINF are important to deterrence because they constitute a link between conventional capabilities and U.S. strategic forces. These two systems complement short-range nuclear systems. The range of options resulting from conventional, nonstrategic nuclear, and strategic nuclear forces provides a means to control escalation and stop conflict at the lowest level possible should deterrence fail. Additionally, the flexibility of these nuclear forces strengthens stability.

—Since it is U.S. and NATO policy that modernization of NATO's nuclear systems should not take precedence over modernization of conventional forces, there will be no increased dependence on nuclear weapons resulting from such deployments—as explicitly recognized in the December 1979 modernization decision.

—Warsaw Pact forces have over the years developed massive nuclear and conventional systems, far more than the level and capability required for defense. Deployment of the SS–20 is particularly unsettling. Failure to counter this threat, either by Pershing

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II and GLCM deployment or the achievement of an acceptable arms control agreement, would be highly destabilizing.

—The United States and its allies remain committed to both tracks of the 1979 decision on force modernization and negotiation. Thus, while Pershing I and GLCM programs continue apace, in order to provide the Soviets the incentive to negotiate seriously, the President has proposed an agreement that would trade the elimination of Soviet SS–20, SS–4, and SS–5 systems in return for cancellation of Pershing II and GLCM deployments.

—The Soviets are worried about the prospects of Pershing II and GLCM deployment. The U.S.S.R. might react with additional weapon programs and further diplomatic activity of its own in Western Europe directed at turning allied governments against modernization.

Short-Range Nuclear Forces

Dual-capable artillery and short-range missiles comprise the lower end of the spectrum of U.S. nuclear weapons, and are an important component of NATO's military forces and the U.S. nuclear deterrent posture. By posing the credible option of their effective use on the battlefield, they enhance deterrence. They also enhance conventional force effectiveness by denying an aggressor the option of massing forces to overwhelm our defenses without risking the creation of lucrative nuclear targets. These new warheads improve various performance characteristics of nuclear artillery projectiles and the Lance missile. The addition of an enhanced radiation [ER] capability makes possible a reduction in blast and thermal yields, compared with predecessor weapons, thus reducing the potential for collateral damage to civilians, friendly military forces, and facilities.

—On August 6, 1981, the President announced that ER weapons would be produced and stockpiled solely on U.S. territory. Any decision to deploy ER warheads would be taken only after close consultation with any country on whose territory they would be based, and then only with the explicit approval of the President.

—Soviet short-range nuclear forces, like their longer range counterparts, are undergoing rapid modernization; for example, development of the new SS–21 missile to replace the older Frog rockets and introduction of new self-propelled 203-mm. and 240-mm. nuclear artillery systems. The new U.S. short-range nuclear systems have not been developed in response to these specific developments, but rather in concern over across-the-board improvements in Warsaw Pact military capabilities.

—Modernization of these warheads through improvements in range, accuracy, control, and security features represent evolutionary changes in existing weapons; the improvements are unlikely to affect significantly existing perceptions of these weapons or their relationship to U.S. arms control efforts. The effective implementation of the NATO doctrine of flexible response in a manner consistent with announced strategy contributes to stability in Europe—an arms control objective.

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—The existence of ER weapons may be perceived by adversaries to increase the credibility of the NATO deterrent; thus their availability would increase deterrence of war overall, but at the same time could increase Soviet concern regarding the use of nuclear weapons if they have decided to go to war. This is the dilemma of nuclear deterrence, which must contain some threat of use to be credible.

—The U.S. understanding, placed on record at the time of signing the additional protocol I to the 1949 Geneva Convention (adopted in 1977 by the Law of War Conference) is that the rules established by the protocol were not intended to have any effect on, and do not regulate or prohibit the use of nuclear weapons. The protocols are currently under interagency review to determine whether or not they should be submitted to the Senate for its advice and consent to ratification.

—The Soviet Union has sought propaganda advantages by proposing U.S.-U.S.S.R. mutual renunciation of development and production of ER weapons. Such an agreement would provide asymmetrical advantages to the Soviet Union, since the principal value of ER weapons lies in their potential use to defend against an armed offensive, a problem facing NATO but not the Warsaw Pact.

CHEMICAL WARFARE

Proposed fiscal year 1984 chemical warfare [CW] programs will continue initiatives in active RDT&E for both deterrent retaliatory and defensive CW needs; procurement of an improved protective CW capability; initiation of the modernization of the U.S. deterrent retaliatory capability; development of the capabilities to dispose of the deteriorating chemical agent stockpile; and maintenance of currently stockpiled chemical munitions. The programs support the objective of maintaining adequate defensive and deterrent retaliatory capabilities, as well as increasing the safety and usability of the systems involved.

—U.S. ratification of the Geneva protocol and the Biological Weapons Convention [BWC] underscores the U.S. commitment to the objective of the complete, effective, and verifiable prohibition of all chemical weapons. The administration has confirmed continued U.S. support for such prohibition of CW production, development, and stockpiling, recognizing that for the foreseeable future such a prohibition would be unverifiable by NTM alone and that other measures, including onsite inspections, would be required.

—The U.S. emphasis from 1977 to 1980 was on CW arms control and on maintaining our CW deterrent retaliatory forces without force improvement. Against the background of a continuing CW threat and a lack of sufficient progress in arms control, the administration and the Congress initiated alternative policies. Fiscal year 1976 legislation required Presidential certification before binary weapons could be produced. On February 8, 1982, the President certified to the Congress that production of binary weapons was "essential to the national interest." A Defense Department Report to Congress on the United States Chemical Warfare Deterrence Program, submitted in March 1982, concluded that in view of the

overall United States-Soviet military balance, we cannot rely on other components of our military capabilities—in particular nuclear weapons—to deter CW and that we have been unable to eliminate the threat through negotiations or unilateral U.S. restraint. Hence, U.S. defensive and retaliatory capabilities must be improved.

—Soviet military doctrine provides for the use of CW; Soviet forces are the best prepared and equipped in the world to operate in a CW environment. The Soviets have devoted more resources than the United States to nuclear/biological/chemical [NBC] defense and protection. It is expected that the Soviets will continue to improve their NBC capabilities for the foreseeable future.

—Since 1976, the Soviets have used or provided for use toxin and other CW agents in Southeast Asia and in Afghanistan. Although these conflicts present situations different from what could be expected in a war in Europe, available evidence shows that CW remains an intrinsic part of Soviet military strategy.

—The effect of Soviet CW use in Europe would be doubly severe if NATO forces alone were subject to such attack without the enemy being equally impeded by chemical attack. The need to deter the use of CW in any conflict is critical.

—The administration views a chemical retaliation capability as the most credible and effective specific deterrent presently obtainable against Soviet CW use. Defense/protective measures alone cannot constitute a credible deterrent. The threat of CW retaliation would be more credible and less escalatory than a threat to use nuclear weapons.

—The objective for the retaliatory element of the U.S. CW program is to maintain the safest, smallest chemical munitions stockpile that provides the ability to deny a significant military advantage to any initiator of CW. The United States does not plan to match the Soviets in agent/munition quantities of any type, and will continue to exercise restraint. It will make only those improvements necessary to insure that the United States has a credible and effective deterrent retaliatory capability.

—CW modernization actions do not represent a decision to place greater reliance upon CW, but reflect overall U.S. national security policy to deter war. They enable the United States to gain crucial negotiating leverage in the area of CW arms control.

—The importance of achieving effective verification measures in any CW agreement is underscored by Soviet use of toxins and other agents in Southeast Asia and Afghanistan, and the Soviet unwillingness to discuss U.S. concerns about Soviet compliance with the BWC and the Geneva protocol.

—Fully implementing a CW ban would take at least 10 years for the disposition of declared facilities and destruction of declared stocks, and would require onsite verification under independent, international auspices.

—Since the suspension of U.S.-U.S.S.R. CW talks in 1980, the U.S. Ambassador informed the Committee on Disarmament [CD] in March 1982 that the possibility of resuming bilateral negotiations remains open, pending a demonstration by the Soviet Union of

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genuine readiness to negotiate effective verification and compliance arrangements. The United States has played an active role in the CD working group on CW, and continues to bring pressure to bear on the Soviet position, particularly on verification. The Soviets are perceived to be holding an unreasonable and unforthcoming position.

—The U.S. CW program should contribute to stability. Continued reliance on the existing stockpile, however, could encourage instability.

—The Soviet Union can verify easily that the United States is actually conducting the CW program which we openly claim.

Directed Energy Programs

Fiscal year 1984 directed energy [DE] programs attempt to explore the technologies and develop the potential of DE weapons which, if actually developed, would have potential mission advantages over many existing types of weapons against missiles, aircraft, and spacecraft targets, due to the extremely high delivery speed of the damaging energy to the targets. While high energy lasers [HEL] and particle beams [PB] differ in state of development and in technology required to realize them, they have potential for weapons systems of similar operational characteristics and they could have similar implications for the future of the ABM Treaty, possible ASAT negotiations, and space defense issues generally.

—DE research allows the United States to stay abreast of technologies having military potential and to gain insight into what the U.S.S.R. may be discovering through its own research, thus providing confidence that the United States can maintain an adequate balance of forces.

—Current DE research programs are not constrained by existing arms control agreements. The BMD potential of future DE weapons could eventually create a conflict with the obligations assumed by the United States under the provisions of the ABM Treaty. The ABM Treaty prohibits development, testing, and deployment of space-based ABM systems, or components for such systems. Although the treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as HEL and PB), including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the treaty prohibits their deployment unless the parties consult and amend the treaty.

—With regard to DE systems in an ASAT role, only the actual use of systems to interfere with NTM used to verify compliance with strategic arms control agreements is prohibited under the ABM Treaty, the SALT I Interim Agreement, and the SALT II Treaty. The Outer Space Treaty, the Direct Communications Link Improvement Agreement, and the International Telecommunication Convention all impose certain restraints on ASAT activities, if they result in prohibited interference.

—Because of the lack of significant near-term development of U.S. or foreign PB weapons for any military missions, it is unlike-

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ly that PB weapons questions would affect current and prospective negotiations in the near term.

—It is not possible at this time to make a reasonable assessment of the net impact of the HEL program on future global or regional stability.

—Given a DE weapon-related arms control agreement, the United States would insist on adequate verification measures. NTM alone may not be adequate and some form of cooperative measures may be required to contribute to mutual confidence.

Abbreviated Arms Control Impact Statement

As in the fiscal year 1983 ACIS, the fiscal year 1984 submission contains two sets of abbreviated ACIS: one for Department of Defense [DOD] programs and one for Department of Energy programs.

The abbreviated DOD ACIS contains two sections. Section I, listing programs for which ACIS were previously submitted, includes antiship missile systems, large area ocean surveillance systems, strategic warning and attack assessment, advanced isotope separation and centrifuge enrichment, NAVSTAR global positioning system, fleet air defense, medium-range air-to-surface missile, ASW standoff weapon, and inertial confinement fusion. While these programs have continuing arms control implications, there have been no significant changes in funding, program direction, policy, or international developments that would revise the administration's analysis forwarded in early 1982. The need for updated ACIS will be reevaluated as these programs evolve.

Section II includes other programs which meet congressional criteria for ACIS but for which indepth ACIS were not prepared. For each program, a brief description is given along with its program element number and R-1 or P-1 report page and line number, as applicable. Activities within these programs are primarily associated with one or more of the following:

—Programs in too early an exploratory research and development stage to determine with precision their possible arms control implications.

—Programs providing continuing normal support for existing missions or deployed operational systems and organizations.

—Production and procurement of a developed weapon system; nonnuclear munitions, cartridges, projectiles, rockets, et cetera, and associated equipment; spares and repair parts; associated electronic, communications, training, and support equipment; support, storage, industrial, and test facilities construction and operation; utility and specialized vehicles, ships, tanks, and aircraft; miscellaneous production charges, first destination charges and outfitting costs. In themselves, none of the activities in this category is judged to have a significant impact on arms control policy or negotiations.

—Modification or modernization of an already procured system which does not significantly alter the characteristics of the system from an arms control standpoint.

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—Programs which were analyzed as indepth statements in previous years and found to have little, if any, additional arms control impact.

—Programs involving miscellaneous research, development, testing, and evaluation of programs not otherwise categorized, which are judged to have marginal, if any, impact on arms control policy or negotiations.

The abbreviated ACIS for the Department of Energy programs list those activities related predominantly to normal maintenance and reliability assessment of the nuclear stockpile. Because they do not provide for additional warheads/bombs or for significant changes in characteristics or deployments, none of them is judged to have a significant impact on arms control policy or negotiations. The ACIS lists 21 different nuclear warheads and gravity bombs, with a brief statement about the weapons systems for which they were developed.

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PART I: ARMS CONTROL IMPACT STATEMENTS SUBMITTED BY THE ADMINISTRATION

ICBM PROGRAMS

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11213F	MINUTEMAN Squadrons
Procurement	ICBM C^3 Integration
DOE	W78 Warhead
64312F	Peacekeeper (MX)
Procurement	Peacekeeper (MX)
DOE	W87/MK-21 Peacekeeper (MX) Warhead
63311F	Advanced Strategic Missile Systems (ASMS)*

All of these programs are directly related to maintaining or improving the capabilities of the US land-based ICBM force. As

* Includes the former Advanced Ballistic Reentry System (ABRES) program.

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such, the arms control implications of these programs are best analyzed in a single impact statement.

II. PROGRAM DESCRIPTIONS

The US ICBM force is one of the three components of the US Triad of strategic nuclear offensive forces. The ICBM operational force is composed of 550 MINUTEMAN III (MM III) ICBMs, each with up to three multiple independently targetable reentry vehicles (MIRVs), 450 single warhead MINUTEMAN II (MM II) ICBMs, and 49 single warhead TITAN II ICBMs. These 1049 operational missiles will carry up to 2149 warheads of various yields and accuracies.

In October 1981, the President directed that all TITAN missiles be deactivated as soon as possible. Phase out has begun at the rate of about one missile per month, and all TITAN missiles are expected to be retired by FY 1987.

A. MINUTEMAN Squadrons (PE 11213F).

The MINUTEMAN force is deployed in hardened and dispersed underground silos. The missiles are controlled by combat crews from hardened underground launch control centers. A number of improvements have recently been made or are being made in MINUTEMAN systems:

1. Survivability: The Upgrade Silo Program provides improved protection to the missile launch facilities from blast and shock, radiation, and electromagnetic pulse, and was completed in January 1980. The MM Extended Survivable Power Program begins

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installing long-life emergency power lithium batteries in 200 MM III silos in April 1984 with completion in April 1986.

2. Improved RV: The MK-12A reentry vehicle is being acquired to replace the MK-12 RV on 300 of the 550 MM III missiles currently deployed. Initial operational capability (IOC) was achieved in FY 1980. Deployment of the MK-12A on the 300 MM III missiles is scheduled to be completed in FY 1983. Current plans do not call for the MK-12A to be deployed on the remaining 250 MM III missiles.

The MK-12A RV was designed to be employed against the total spectrum of targets but increasingly has been planned for employment against a growing Soviet hardened target system, where its combination of yield and accuracy could be used to military advantage. Although the MM III with its current MK 12 RV configuration is effective to some degree against hard targets, improved accuracies which may accrue as a result of the guidance upgrade program and the higher yield of the MK-12A (W78) warhead would increase this capability.

3. Command, Control and Communications (C^3): The Command, Control, and Communications Integration program was initiated in 1978 in order to reduce the transmission, receipt, and processing time for Emergency Action Messages (EAM's) as well as crew workload during time-urgent situations. The design and testing for two elements of this program, the Air Force Satellite Communications System terminals and the Survivable

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Low Frequency Communications System (616A), are completed, and their installation is to be completed in FY 1983. Design of the third element, the Strategic Air Command Digital Network was initiated in FY 1981 and was completed in FY 1982; testing of the integrated digital network will be completed in FY 1983 and installation will begin in FY 1985. The FY 1984 request completes procurement for the ICBM C^3 integration program. Installation and integration of these C^3 systems for MM III will be completed in FY 1987.

4. Accuracy: The Guidance Improvement Program for the MM-III was completed in 1978. The Guidance Upgrade Program was added by Congress in FY 1982, and during that year the design of software revisions was initiated for upgrading MM III guidance. The Guidance Upgrade Program will be completed in October 1983.

B. W78 Warhead (DOE)

Engineering development of the MK-12A, W78 warhead was completed in FY 1977. First production of W78 warheads for the MINUTEMAN III force was funded in the DOE FY 1979 program; quantity production began in FY 1979 and is scheduled for completion in FY 1983.

C. Peacekeeper (MX) (PE 64312F).

1. Program Description

The Peacekeeper (MX) program provides for full-scale engineering development and test leading to production of a new, more capable ICBM. The missile booster, guidance and control

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systems, postboost vehicle, and reentry system are being developed, tested, and integrated into a missile system.

Peacekeeper (MX) subsystems are planned to be operational designs of the preprototype hardware currently under development. These include: (1) an improved guidance system; (2) the Peacekeeper (MX) Post-Boost Vehicle which, although significantly larger than that on MM III, would use a similar well-proven technology and configuration; and (3) the Advanced Ballistic Reentry Vehicle (ABRV) which was developed as part of the Advanced Strategic Missile Systems (ASMS) program. The final DOD decision on the Peacekeeper (MX) reentry vehicle has resulted in selection of a version of the ABRV as the new baseline.

2. <u>Program Status</u>

In early October 1981, the Administration announced that it would continue to develop the Peacekeeper (MX) and that at least 100 Peacekeeper (MX) ICBMs would be deployed, but that they would not be deployed in what was known as a Multiple Protective Structures (MPS) basing mode as previously planned.

Contracts for full-scale engineering development have been awarded for all stages of the missile. The development of the Peacekeeper (MX) missile system is not a high-risk engineering effort.

The System Design Review was conducted in September 1980, and preliminary design reviews were conducted in FY 1981 to review and approve hardware design concepts and to authorize

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initiation of detailed hardware designs. Propulsion flight proof testing was completed in September 1982; the first flight test is scheduled for early 1983, and a production decision on the Peacekeeper (MX) is projected for mid-1983, leading to an initial operational capability in late 1986.

The basing mode for the Peacekeeper (MX) system is still under consideration with a final basing decision to be made in the near future. On November 22, 1982, President Reagan announced his decision to proceed with the production and deployment of the Peacekeeper (MX). At that time, the President proposed that the Peacekeeper (MX) be deployed in a Closely Spaced Basing (CSB) configuration near F.E. Warren Air Force Base, Cheyenne, Wyoming.

In the 1983 Continuing Resolution of December 1982, the Congress decided to restrict obligation or expenditure of funds for full-scale engineering development of a permanent basing mode for the Peacekeeper (MX) and to prohibit missile flight testing until both Houses of Congress have approved a permament basing mode. The Congress also requested that a report on Peacekeeper (MX) basing and alternatives to Peacekeeper (MX) deployment be submitted to the Committees on Appropriations not earlier than March 1, 1983.

The President established a bipartisan Commission on Strategic Forces on January 3, 1983, which is to report to the President by February 18, 1983. The Commission is to review

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basing alternatives for the Peacekeeper (MX) missile as well as alternatives to the Peacekeeper (MX) system itself. The President will submit his report to Congress on or after March 1, 1983.

D. Procurement -- Peacekeeper (MX).

The FY 1984 request funds the procurement of Peacekeeper (MX) missiles and basing related hardware needed to deploy them.

E. W87/MK-21 Peacekeeper (MX) Warhead (DOE).

In January 1982, the final DOD decision on the Peacekeeper (MX) warhead resulted in the selection of the W87 warhead to be mated with the ABRV (MK 21). [Deleted].

F. Advanced Strategic Missile Systems (PE 63311F).

The Advanced Strategic Missile Systems (ASMS) program provides for technology application and advanced development for ballistic missile systems, subsystems, reentry and penetration aids for existing and future ICBMs, IRBMs, and SLBMs. The FY 1984 program will focus on developing early penetration aids prototypes for the Peacekeeper (MX) that are adaptable to the MM III. There will be three ICBM defense penetration decoy development flight tests using MINUTEMAN I missiles in 1984 and 1985 and two Peacekeeper (MX) penetration aids deployment systems tests on Peacekeeper (MX) missiles in 1986.

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III. STATED MILITARY REQUIREMENTS

US policy is to deter war by maintaining credible conventional and nuclear forces that present unacceptable risks to a potential aggressor contemplating violence at any level. To be a credible deterrent, US conventional and nuclear forces must be manifestly capable of denying the objectives of any potential aggressor. US nuclear strategy requires that US nuclear forces must be capable, regardless of circumstances, of surviving a Soviet first strike with sufficient forces remaining to retaliate effectively. Thus, the US requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of holding at risk those things that the Soviet leadership values most highly -- military and political control, nuclear and conventional military assets, and the industrial capability to sustain war.

The ICBM force provides the necessary capability for the National Command Authority, in any phase of a nuclear conflict, to execute attacks ranging from limited options to full-scale retaliation. The combination of accuracy, reliability, rapid retargeting, secure, survivable C^3, and ballistic penetrativity makes the land-based missile an extremely flexible system. These attributes of the land-based ICBM force have made and will continue to make a major contribution to the deterrent posture of the United States.

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Unlike our current ICBM force, the Peacekeeper (MX) will possess sufficient accuracy and yield to hold at risk the full range of Soviet assets. In addition, it will be deployed in a survivable basing mode which will reduce Soviet ability to hold US ICBMs at risk. When fully deployed, the Peacekeeper (MX) will thus enhance deterrence by eroding Soviet confidence in their ability to mount successfully a first strike. Their confidence in maintaining a safe haven for their remaining ICBM assets following such a strike will also be eroded.

US strategic forces also serve broader political objectives by denying the Soviet Union any political or military benefits that might result if Soviet leaders, allies, or third countries perceived Soviet strategic forces to be superior.

While the analysis of strategic vulnerability is sensitive to many variables and scenarios, it is generally accepted that the pace and scope of Soviet ICBM programs pose a threat to the survivability of the current US fixed-silo ICBMs in the 1980s. The Soviet ICBM force is presently equipped with about 5000 fourth generation RVs, sufficient to target two RVs against each US silo while still retaining a large number of RVs for other missions and for reserve forces. Projected deployments show this number increasing during the 1980s if constraints or reductions are not imposed by a strategic arms reduction agreement.

The decision to maintain the deterrent value of a survivable ICBM leg of the Triad, and to redress the political military implications of an asymmetry in prompt hard-target-kill capabilities favoring the Soviet Union, has led to the decision to develop and deploy the Peacekeeper (MX) missile.

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IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
MINUTEMAN Sqdns. (11213F)										
Development $	3926.5	12.9	5.1	[		[Deleted]				]
Production $	9907.5	148.6	213.9	[						]
MK-12A RV (11213F)										
Development $	[					[Deleted]				]
Production $	[									]
W78 Warhead (DOE)										
Development $	[					[Deleted]				]
Production $	[									]

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IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Peacekeeper (MX) (64312F)										
Development $	1913	2509	3470	[						]
Production $			3630				[Deleted]			
Construction $	11	1.7	45	[						]
W87/MK-21 Peacekeeper (MX) Warhead (DOE)										
Development $	[									]
							[Deleted]			
Production $	[									]
ASMS (63311F)										
Development $	2252.9	49.7	101.3	[			[Deleted]			]

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Equitable and verifiable arms reduction agreements, when combined with sound foreign and defense policies, can play a critical role in enhancing deterrence and ensuring a stable military balance. The President has outlined the objectives of US arms control policy as follows: Reduce significantly the size and destructive potential of nuclear arsenals; seek agreements which will lead to equal levels of forces on both sides; seek agreements which enhance US and Allied security and reduce the risk of war; and insist on verification measures to ensure compliance with the provisions of arms control agreements.

At the same time, the strategic forces modernization program is necessary to correct imbalances created by a unilateral US restraint and an enormous Soviet military investment and deployment of new generations of strategic systems. The result will be a deterrent that is more secure and stable than exists today. This should, in turn, create the incentives necessary for the Soviets to respond seriously to proposals for equitable and verifiable reductions in arms.

The production of the Peacekeeper (MX) and its deployment will result in a more secure and stable strategic deterrent force and create incentives for the Soviets to enter into meaningful negotiations for arms reduction treaties. Secure retaliatory forces must be able to place at risk a wide range of Soviet

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military targets, and thus deter aggression against the US and our allies.

B. Relation to Arms Control Agreements.

The policy of the Administration is not to undercut existing strategic arms agreements so long as the Soviet Union shows equal restraint. This policy may contribute to an atmosphere of stability while the US attempts to achieve more meaningful agreements that will reduce the number of nuclear weapons and enhance our national security, thus providing a more positive atmosphere for the Strategic Arms Reduction Talks (START) and the Intermediate-Range Nuclear Force (INF) negotiations.

1. SALT I Interim Agreement.

When the 1972 SALT I Interim Agreement expired, both the US and the Soviet Union stated their intentions to take no action inconsistent or incompatible with Interim Agreement provisions as long as the other side does the same, although neither party has a legal obligation to do so. SALT I permitted modernization and replacement of strategic ballistic missile systems. It precluded the construction of new fixed land-based ICBM launchers, but it did not limit the development of new missiles for either

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fixed or mobile launchers.* Thus, the development of Peacekeeper (MX) and prospective improvements for MINUTEMAN are consistent with the provisions of the Interim Agreement.

The proposed use of CSB for Peacekeeper (MX) deployment, however, raised the question of whether such a basing mode would constitute a new fixed-launcher deployment. We do not believe it does. Because the same question arises in respect to the SALT II Agreement, this question is discussed in the next section.

2. SALT II Agreement

The SALT II Agreement was signed in June 1979, but it has not been ratified. The position of the Administration is that SALT II is a flawed agreement and not a sound foundation for long-term arms control. Therefore, ratification will not be pursued. However, it is current US policy to take no action which would undercut existing strategic arms agreements, provided the Soviets exercise equal restraint.

The launcher limits which affect MX are: no more than 1200 launchers of MIRVed ballistic missiles or 820 launchers of

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* The Interim Agreement states:

Article I: The Parties undertake not to start construction of additional fixed land-based intercontinental ballistic missile (ICBM) launchers after July 1, 1972.

Article IV: Subject to the provisions of this Interim Agreement modernization and replacement of strategic offensive ballistic missiles and launchers covered by this Interim Agreement may be undertaken.

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MIRVed ICBMs. The deployment of the Peacekeeper (MX) would not prevent us from meeting the launcher limits since less capable systems could be retired.

The SALT II agreement also prohibits flight testing or deployment of a new ICBM with more than 10 RVS. [Deleted].

The "new types" provision of the SALT II Agreement limits each side to flight-testing and deployment of only one new type of ICBM for the duration of the Treaty. The Peacekeeper (MX) will be the only new ICBM type flight-tested by the US in the foreseeable future.

Except with respect to the one "new type" of ICBM that is permitted, Article IV prohibits the flight-testing or deployment of ICBMs which are different from those ICBMs flight-tested as of May 1, 1979, in the following respects:

- the number of stages;
- the length, the largest diameter, the launch-weight, or the throw-weight of the missile (but variations of up to 5% are permitted with respect to these measures);
- the type of propellant (that is, solid or liquid) of any of its stages.

No modifications of MINUTEMAN II or III are planned which would be

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affected by any of these limitations, and all planned ASMS flight-tests utilizing MINUTEMAN I boosters would satisfy these limitations.

As in the Interim Agreement cited above, the SALT II Agreement states (in Article IV) that each party undertakes "not to start construction of additional fixed ICBM launchers". Neither agreement, however, provides a definition of a fixed ICBM launcher. The deployment of Peacekeepers (MXs) in canisters, as in the CSB mode, would not entail the construction of new fixed launchers in the strict SALT sense. All essential launch equipment would be included in the canister, not as an integral part of the silo as in current fixed ICBM systems. The canister with the missile would be transportable. Such a canister basing mode thus would be a new concept for the deployment of land-based ICBMs and would not undercut the SALT Agreements.

The MK-12A RV and the W78 warhead in the MK-12A would not be affected by the limitations on "new types." Furthermore, the MK-12A RV was tested before May 1, 1979, and thus is not covered by SALT II limitations concerning the weight of RVs on existing types of ICBMs.

3. <u>The Non-Proliferation Treaty (NPT)</u>.

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 117 other countries are parties, states:

> "Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating

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> to cessation of the nuclear arms race at an early date and to nuclear disarmament,... "

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon-state parties.

As President Reagan emphasized in his policy statement of July 16, 1981, the US is committed to preventing the spread of nuclear weapons to additional countries. The US strongly supports adherence to the NPT and seeks to reduce the motivations for acquiring nuclear explosives by improving regional and global stability and addressing the legitimate security concerns of other states.

In keeping with Article VI, the US has participated in arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT, and is now participating in INF and START negotiations. As part of the 1979 two-track INF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on INF. The US and the USSR began the negotiations on November 30, 1981, in Geneva, Switzerland. On June 29, 1982, the US and the Soviet Union began START negotiations -- also in Geneva. The US held intensive consultations with its Allies in preparation for these negotiations.

Despite such efforts, many of the nonaligned nations argue that there has been an intensification of the US-USSR

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nuclear arms race since the NPT entered into force in 1970, and that these developments have been contrary to Article VI. For this reason, the 1980 NPT Review Conference was unable to achieve a consensus on a final declaration. The nonaligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

4. The Threshold Test Ban Treaty.

In 1974, the United States and the Soviet Union signed the Threshold Test Ban Treaty (TTBT), which prohibits underground nuclear weapon tests with design yields above 150 kilotons (KT). Neither party has ratified this treaty; however, in 1976, both the US and USSR stated that they would observe the 150 KT threshold pending the treaty's entry into force, providing the other also did so. There are serious questions relating to Soviet observance of the 150 KT limit as well as the ability of the US to verify Soviet observance.

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Final selection of the baseline Peacekeeper (MX) warhead [deleted]. In this sense, deployment of the Peacekeeper (MX) is constrained by the TTBT.

5. The ABM Treaty.

The ABM Treaty permits development and testing of fixed land-based ABM systems and their components at agreed test ranges. Both the Soviet Union and the US have R&D efforts in ballistic missile defense. A viable ABM defense of US ICBMs could improve ICBM survivability and is under study as an element of a long term option for maintaining the survivability of the Peacekeeper (MX).*

The availability of advanced US technology, such as advanced maneuvering re-entry vehicles (MaRVs), precision guidance, and penetration aids, provides disincentives for the Soviets to upgrade or deploy an improved ABM system around Moscow or elsewhere by reducing its potential effectiveness in preventing the arrival of US ballistic missile RVs and thereby making its deployment economically and militarily unsound.

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* For a complete discussion, see the ACIS on Ballistic Missile Defense.

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C. Effect on Current and Prospective Negotiations.

1. Strategic Arms Reduction Talks.

On November 18, 1981, President Reagan announced that the US would seek to negotiate significant reductions in nuclear arms which would result in levels that are equal and verifiable. On May 9, 1982, the President announced a two-phased US approach to the Strategic Arms Reduction Talks. In the first phase of negotiations, the US seeks to reduce the number of warheads on deployed strategic ballistic missiles by about one-third, to 5,000 on each side. No more than half the remaining strategic ballistic missile warheads would be on land-based missiles. The US also seeks to cut the total number of deployed strategic ballistic missiles on each side to an equal level of 850, about one-half of the current US level. In the second phase of negotiations, the US will seek further reductions in overall destructive power of each side's arsenals to equal levels, including a mutual ceiling on strategic ballistic missile throw-weight below the current US level.

The President's proposal attempts to reduce the threat of nuclear war by enhancing deterrence and securing a stable nuclear balance. The main threat to the strategic balance has been the massive Soviet buildup of its strategic ballistic missile forces. Because of their large size, increasing accuracy, and short flight times, Soviet strategic ballistic missiles (and particularly land-based ICBMs) pose a significant threat to US deterrent forces.

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To enhance deterrence and ensure a stable nuclear balance, the President's proposal focuses, in the first phase, on significant reductions in strategic ballistic missile warheads and deployed strategic ballistic missiles themselves. (See TABLE 1.) This would halt and reverse the destabilizing trend which would have been permitted under the SALT II Treaty, if it were ratified.

In the second phase, the US seeks further reductions to equal ceilings on other elements of strategic forces, including strategic ballistic missile throw-weight. Throw-weight is an important measure of the size and destructive potential of ballistic missiles. First phase reductions will reduce the current disparity in strategic ballistic missile throw-weight, and lay the ground-work to achieve an equal throw-weight ceiling below current US levels in the second phase.

This approach would lead to significant reductions on both sides and a stable nuclear balance, which should be in the interest of both the US and USSR. Under a ceiling of 5,000 strategic ballistic missile RVs as envisioned by the US START proposal, the US would have sufficient weapons to meet its strategic retaliatory requirements.

The Peacekeeper (MX) is fully compatible with the US START proposal, and lends itself to flexible force sizing. The number of missiles eventually deployed could be sized upward or downward depending on the size and character of projected threats/ strategic force targeting requirements. The number of Peacekeeper

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TABLE 1: Proposed Reductions - START

	US	USSR
FIRST PHASE		
DEPLOYED Ballistic Missile Warheads (Land-Based and Sea-Based)		
Approximate current levels . .	7,200	7,500
Proposed START ceiling . . .	5,000	5,000
DEPLOYED Land-Based Ballistic Missiles Warheads		
Approximate current levels . .	2,150	5,900
Proposed ceiling	2,500	2,500
DEPLOYED Ballistic Missiles (Land-Based and Sea-Based)		
Approximate current levels . .	1,600	2,350
Proposed ceiling	850	850
SECOND PHASE		
Missile Throw-Weight		
Approximate current levels . .	2 MKG	5 MKG
Proposed ceiling	below current US levels	

(MX) missiles might have to increase if the Soviet threat increased. Within a strategic arms control framework, it would be easier to predict confidently how extensive a Peacekeeper (MX) deployment is required to ensure an adequate ICBM retaliatory capability. The Peacekeeper (MX) deployment could, of course, be sized in various ways to meet increases in the projected threat under either an arms limitation or a no-arms limitation environment.

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2. <u>The Comprehensive Test Ban Treaty (CTBT)</u>.

A Comprehensive Test Ban (CTB) continues to be a long-term objective of US arms control policy. However, there are serious concerns about the national security implications of a CTB under current circumstances, including our ability to verify Soviet compliance with such an agreement. It should be recognized that nuclear testing plays a very important role in ensuring a credible U.S. nuclear deterrent. The United States uses nuclear testing to develop new nuclear weapons, to confirm reliability of stockpiled weapons, to improve the safety and security of weapons against accidental or unauthorized detonation, and to assess the vulnerability of military systems to nuclear effects. For these reasons, the President has decided not to resume the trilateral (US, USSR, UK) CTB negotiations initiated under the previous Administration, but suspended since November 1980. However, the US will continue to participate in discussions on ways to improve verification and compliance related to nuclear testing issues in a special working group of the Committee on Disarmament in Geneva.

D. <u>Effect on Global and Regional Stability</u>.

The overall effect of US ICBM programs on stability is positive. In this analysis, strategic stability is defined as the maintenance of conditions such that neither the US nor the USSR is compelled or induced to employ its strategic forces. Arms race stability is defined as a condition of predictability and

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restraint which lessens the incentives for reactive force buildups. The concept of crisis stability extends beyond the nuclear balance to encompass the broader political-military relationship; the objective of crisis stability is to prevent adverse developments in US-Soviet relations outside of the strategic sphere from escalating to central nuclear war.

In order to ensure stability in crises, the US seeks to maintain a strategic force posture which denies the Soviet Union any confidence in utilizing its strategic forces as instruments of political or military coercion. In this context, considerable concern has developed over the implications for crisis stability of the increasing vulnerability of silo-based ICBMs. It is generally recognized that the Soviet ICBM force now has a much greater prompt hard-target-kill capability against our ICBM force than our force has against theirs, making our ICBMs much more vulnerable to preemptive attack. It is also recognized, however, that our ICBM force is a much smaller component of our strategic forces than the Soviet ICBM force is of their strategic forces. Differences in view on the implications of prompt hard-target-kill capability emerge over the conditions under which each side would be able or impelled to exploit the asymmetry favorable to itself for political or military purposes.

The impact of Peacekeeper (MX) deployment on arms race stability in large part will be determined by Soviet interpretation of the implications of this deployment for the vulnerability

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of the land-based strategic forces of both sides. Peacekeeper (MX) deployment will clearly increase the vulnerability of the Soviet ICBM force. A secure deployment mode for the Peacekeeper (MX) will enhance US ICBM survivability, and if deceptive basing or BMD are added, Peacekeeper (MX) survivability will be further enhanced. In this situation, if the Soviets believed either a) that the Peacekeeper (MX) was sufficiently vulnerable for a reduced ICBM force still to threaten it seriously, or b) that the Peacekeeper (MX) was so invulnerable as not to warrant additional targeting, they might well decide that a reduced ICBM force would be adequate -- assuming its own vulnerability also was reduced sufficiently (e.g. by mobility, deceptive basing, or BMD). On the other hand, if the Soviets judged the Peacekeeper (MX) deployment to be sufficently vulnerable to warrant countermeasures, but sufficiently invulnerable to require large Soviet prompt hard-target-kill forces, they could decide that arms reductions would be too constraining on their own forces. This would be especially true in the near-term if they did not anticipate rapid development of a counter to the threat posed to their existing fixed-based ICBMs by the Peacekeeper (MX).

The Soviet response to Peacekeeper (MX) deployment will thus be a function of the overall threat to Soviet ICBMs, as well as of the continuing utility perceived for the prompt hard-target-kill capability embodied in them. While deployment of 100 Peacekeepers (MXs) with 1000 warheads will only partially

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redress the current large imbalance in prompt hard-target-kill, in conjunction with the US MM force, Peacekeeper (MX) deployment will threaten those Soviet systems primarily responsible for that imbalance -- the more than 600 fixed-based SS-18 and SS-19 ICBMs. Thus, Peacekeeper (MX) deployment should provide a major incentive for the Soviets also to seek ways to make their land-based ICBMs less vulnerable.

In combination, implementation of the US strategic program and agreement on US proposals in START could contribute significantly to enhancement of stability and deterrence by lessening the Soviet incentive to use or threaten to use military force. By strengthening the three components of the Triad and by reducing their vulnerability, including that of their C^3, the destabilizing trend generated by Soviet concentration on large, MIRVed ICBMs can be halted and then reversed. Stability and deterrence will be enhanced to the extent that the Soviet Union recognizes that any nuclear attack would not destroy the U.S. forces and C^3 necessary for us to respond against both remaining Soviet nuclear capabilities and against the Soviet conventional forces essential to achieve any lasting military, political and economic gain from a preemptive nuclear attack. The US START proposals and the less vulnerable strategic force structure planned under the Administration's new strategic programs thus offer the prospect that both sides could achieve enhanced security at reduced force levels.

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Preserving the ICBM component of the Triad in a more survivable basing mode, while at the same time decreasing the vulnerability of our C^3 network, will provide less opportunity and incentive for a preemptive attack against our strategic forces. During the START negotiations, an attempt is being made to persuade the Soviets that it is in their interest to reduce the preemptive threat posed by their ICBM force to our strategic systems. By reducing the number of prospective targets through survivable MX basing, we will be removing one of the primary Soviet incentives for maintaining this preemptive threat.

There are political as well as military reasons to retain US prompt hard-target-kill capabilities. Failure to deploy Peacekeeper (MX) could lead to perceptions of Soviet advantage with the following implications: (1) greater Soviet freedom of action in the employment of conventional forces; (2) greater Soviet latitude in the utilization of nuclear strength for political coercion; (3) the development of new perceptions of relative US and Soviet strength among third countries that could have a wide impact on US foreign policy; and (4) an adverse affect on Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe. Thus, the decision to build and deploy the Peacekeeper (MX) missile reflects a judgment that the paramount necessities at present are to maintain the ICBM leg of the Triad's unique contribution to credible deterrence and to deny the Soviets any political or military advantages that may result from a growing asymmetry in

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relative ICBM capabilities. On balance, it is judged that there would be little prospect for improving stability and for concrete arms control results involving Soviet ICBMs in the absence of a decision to modernize the US ICBM force.

The effects of Peacekeeper (MX) deployment on regional stability will be felt most in the perceptions of US allies. In Western Europe and elsewhere, ICBM force modernization programs could affirm US resolve to pursue equivalency with the Soviet Union in strategic forces, and could strengthen perceptions of US determination to prevent strategic force asymmetries which would provide political or perhaps military advantages to the Soviet Union.

E. Technological Implications.

The sophistication of the R&D included in US ICBM programs would not be expected to stimulate technological competition with countries other than the Soviet Union.

The deployment by the US of systems which would significantly improve missile accuracy or the pursuit of technology programs (e.g., Advanced MaRV or precision guidance) which could provide even greater accuracies, could stimulate continued competition with the Soviet Union in this area. However, the Soviets recently have made significant progress of their own in ICBM accuracy and have tended to stress development in areas driven by their military requirements rather than in reaction to US program developments. The Soviets could also turn to basing modes offering increased survivability.

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F. <u>Potential Interaction with Other Programs</u>.

The strategic modernization program will guide the long-term development of the US strategic forces. It will help redress the deteriorated strategic balance with the Soviet Union. The result will be a deterrent that is far more secure and likely to enhance stability than the present US nuclear force. This should, in turn, create better incentives for the Soviets to negotiate genuine arms reductions.

G. <u>Verification</u>.

Arms control agreements cannot be based on trust alone, particularly with a highly secretive adversary like the Soviet Union. There must be effective means of verification that enable the US to know with confidence whether the terms of agreements are being honored. In practice, this means the US must be able to monitor activities in the areas covered by these treaties in order to detect any violations. Arms control agreements that cannot be effectively verified are not acceptable.

In the past, the US relied primarily on national technical means (NTM) of verification. As arms control agreements, the systems they cover, and the possibilities of concealment become more complex, it may be necessary to supplement NTM with some form of "cooperative" measures of verification. The Reagan Administration has made it clear that the US will insist on effective verification procedures to ensure full compliance with the provisions of any agreement, including the possibility of measures

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beyond NTM, if necessary, to achieve US objectives. Deployment of a new Soviet fixed ICBM can be verified by US NTM, as has been the case in the past.

Although permitted by the basic SALT II Agreement after the expiration of the Protocol, the deployment of a mobile ICBM, particularly a Soviet mobile ICBM, could raise verification problems. The basic SALT II Agreement explicitly permitted modernization and replacement of strategic weapon systems, including the development of mobile ICBM launchers, and after the Protocol was to have expired on December 31, 1981, deployment of and flight-testing from mobile ICBM launchers.

Soviet technology for ground-mobile launchers is already well developed. [Deleted]. The different intelligence-gathering environments in the two countries would make it more difficult for the US to monitor compliance [deleted].

It is clear that the increased capabilities of each side's strategic forces place increased burdens on monitoring capabilities, although such obstacles can be reduced by negotiated agreement and cooperative measures if both sides desire to do so.

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VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The increasing vulnerability of the MINUTEMAN force, the necessity to maintain the deterrent contribution of the ICBM leg of the Triad, the political and military implications of an asymmetry in ICBM capabilities (including prompt, hard-target-kill capabilities) favoring the Soviet Union, and the ongoing and projected overall build-up of Soviet strategic forces have led to the decisions to deploy the Peacekeeper (MX) missile and to continue upgrading the MINUTEMAN force. The decision to deploy the Peacekeeper (MX) reflects a judgment that the paramount necessities are to maintain the ICBM leg of the Triad's unique contribution to credible deterrence and to deny the Soviets any political or military advantages that may result from a major asymmetry in relative ICBM capabilities. The greater capability of the Peacekeeper (MX) will maintain the US ICBM force's retaliatory capabilities, further redressing the perception, and the reality, of increased Soviet advantages in certain force characteristics. Improved prompt hard-target-kill capabilities also could permit the US to attain an effective capability against Soviet military and command/control targets which have been increasingly hardened.

There are political as well as military reasons to retain US hard-target-kill capabilities. Failure to deploy Peacekeeper (MX) could lead to perceptions of Soviet advantage with the following implications: (1) greater Soviet freedom of

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action in tne employment of conventional forces; (2) greater Soviet latitude in the implicit utilization of nuclear strength for political coercion; (3) the development of new perceptions of relative US and Soviet strength among third countries that could nave a wide impact on US foreign policy; and (4) an adverse affect on Allied willingness to deploy GLCM and Pershing II nuclear weapons in Europe.

Deployment of the Peacekeeper (MX) and modifications to the MINUTEMAN would be consistent with the terms of SALT I and II. These agreements would allow modifications of existing weapon systems within specific constraints, and the SALT II agreement would permit deployment of one new type ICBM.

When fully deployed, the Peacekeeper (MX) will bolster deterrence by eroding Soviet confidence in their ability to conduct successfully strategic operations against the United States. By helping to rectify the current imbalance, deployment of the Peacekeeper (MX) will give the Soviets a powerful incentive to negotiate equitable and verifiable reductions in strategic force levels.

The new US strategic program should raise fundamental questions for the Soviets about their heavy reliance upon vulnerable first-strike strategic weapons as the US improves its less vulnerable second-strike capabilities. Substantial Peacekeeper (MX) deployment could result in an increase in US prompt hard-target-counterforce capability to the point that the Soviets

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perceived a substantially greater threat to their ICBM force. Thus, Peacekeeper (MX) deployment should provide a major incentive for the Soviets also to seek ways to make their land-based ICBMs less vulnerable.

Although permitted by the basic SALT II Agreement after the expiration of the Protocol, Soviet deployment of a mobile ICBM could raise serious verification problems. Soviet technology for mobile launchers is well developed. Cooperative measures will be an essential element in any future strategic arms control agreement, and their importance will be significantly enhanced if it is necessary to monitor future Soviet ground-mobile ICBM deployments.

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SSBN/SLBM PROGRAMS

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11221N	Fleet Ballistic Missile System (Improved Accuracy Program)
11228N	TRIDENT (Submarine and TRIDENT I Missile)
Procurement	TRIDENT Submarine
Procurement	TRIDENT I (C-4) Missile
DOE Program	W76 (TRIDENT I) MK-4 Warhead
63371N	TRIDENT II Missile System
DOE Program	TRIDENT II Warhead
Procurement	TRIDENT II Warhead
11402N	Navy Strategic Communications
Procurement	TACAMO/ECX
11401N	Extremely Low Frequency (ELF) Communications
Procurement	UGM-73A (C-3) POSEIDON
Procurement	UGM-73A (C-3) POSEIDON Modification

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These programs are all related since each contributes directly to the Nuclear-Powered Ballistic Missile Submarine/ Submarine-Launched Ballistic Missile (SSBN/SLBM) component of US strategic capabilities. Arms control impact statements are required by the Arms Control and Disarmament Act for each of these programs.

II. PROGRAM DESCRIPTIONS

The SSBN 726 class TRIDENT submarine, missile, and warhead programs are designed to provide a new class of fleet ballistic missile submarines and associated SLBMs to augment and eventually replace the present POSEIDON strategic submarines.* US strategic submarines have the peacetime mission of deterrence of nuclear war, and the wartime missions of strategic and theater nuclear strikes, as well as deterrence of further escalation.

There are 544 US submarine ballistic missile launchers aboard the 33 TRIDENT and POSEIDON submarines in commission. The inventory consists of 304 POSEIDON missile launchers in 19 POSEIDON submarines, 192 TRIDENT I missile launchers in twelve POSEIDON submarines, and 48 TRIDENT I missile launchers in two TRIDENT submarines.

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* All ten POLARIS submarines have been withdrawn from the strategic force. Three of the POLARIS SSBNs have been dismantled in accordance with agreed procedures to comply with the terms of the SALT I Interim Agreement. The remaining 7 SSBNs are still considered as SALT accountable. Their missiles have been off loaded and their weapons systems deactivated.

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A. Fleet Ballistic Missile System (PE 11221N).

This program element contains three projects designed to fund development and maintenance of POSEIDON and TRIDENT I strategic weapons systems as well as other improvement projects for fleet ballistic missile (FBM) submarines. As such, it would extend the effectiveness, survivability and capabilities of both the current and future nuclear powered submarine ballistic missile systems.

The Fleet Ballistic Missile System Project (J0091) has focused on improvements to SSBN unique sonars and strategic weapons systems by providing a continuing, objective assessment of SSBN sonar system performance in the operational environment. In FY 1984 vulnerability and effectiveness study efforts will continue in order to identify threats to weapon system survivability, appropriate corrective measures, and options for performance improvements. Development of the Global Positioning System (GPS) capability will also continue as well as development of sonar training programs.

The SSBN Unique Sonar Project (S0942) is an effort to maintain the acoustic advantage of US SSBNs over Soviet nuclear submarines in the future. This is most relevant for those POSEIDON SSBNs with POSEIDON and TRIDENT I SLBMs which will continue to operate through the 1980s and into the 1990s in a multicontact environment [deleted]. This project is designed to

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upgrade current SSBN towed array processor sensitivity and to improve the SSBN's capability to process and manage the larger amounts of data generated by such increased sensitivity. Existing off-the-shelf Navy standard processing and display hardware is being utilized in this effort. Programs to provide reliability and maintainability upgrades and studies of vulnerability and effectiveness are planned to continue in FY 1984.

The SSBN Unique Countermeasure Development Project (S1265) is designed to increase strategic submarine survivability and protection against the current and post-1985 threat by increasing the performance capability of the Acoustic Countermeasure Receiving System for SSBNs, providing expendable sonar countermeasure devices, and increasing the performance of the Mobile Submarine Simulator. Approval for service use of the improved Acoustic Countermeasures Receiving System is to be obtained in FY 1984.

B. TRIDENT (Submarine and TRIDENT I Missile) and Associated Procurement (PE 11228N).

The TRIDENT, also known as the OHIO class submarine, displaces 18,700 tons when submerged (see Table 1 for TRIDENT characteristics). It is designed to operate at greater maximum speeds and emit less noise than the POSEIDON and POLARIS submarines. In addition, TRIDENT is expected to stay on patrol longer than POSEIDON submarines over the lifetime of the system, largely due to shorter refits and longer periods between overhauls. Its greater at-sea time, combined with the longer range of its missiles,

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permits basing in the United States, and the eventual phasing out of the present POSEIDON base overseas. The use of Rota, Spain and Guam as SSBN upkeep sites has already been discontinued.

TABLE 1: TRIDENT Submarine Characteristics

Operational:	
Maximum Speed (submerged)	about [deleted] knots
Endurance:	
Range	bounded by crew and supply constraints
Stores	90 days
Armament:	
Torpedo Tubes	4
SLBM Tubes	24
Availability of SSBNs operationally ready at-sea	66%
Technical:	
Length	560 feet
Beam (maximum hull diameter)	42 feet
Draft, Navigational	36.1 feet
Displacement (submerged)	18,700 tons
Operating Depth	[Deleted] feet
Propulsion: type	Nuclear
shaft horsepower	[Deleted] horsepower
Crew Size	157

The sea trials commenced in June 1981 for the first submarine; the initial operational capability (IOC) date of the lead TRIDENT submarine, the OHIO, was August 1982. The first TRIDENT submarine in the Pacific is deployed from a base at Bangor, Washington. Almost all targets in the Soviet Union will be in range of TRIDENT I missiles from TRIDENT submarines operating in the Pacific. Deployment of TRIDENT I missiles in the

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Atlantic in POSEIDON or TRIDENT SSBNs allows the coverage of all Soviet targets.

The Navy has chosen King's Bay, Georgia, as the site for the East Coast TRIDENT submarine base. The base has also been developed to support the 12 POSEIDON submarines modified for TRIDENT I missiles.

TRIDENT submarines will be manned by two alternating crews of 157 men (15 officers, 142 enlisted). The 95-day operating cycle will consist of a 25-day refit period followed by a 70-day at-sea period. Crew endurance is the dominant limiting factor in the TRIDENT's ability to stay at sea.

There were nine TRIDENT submarines authorized through FY 1981. There are 15 TRIDENT SSBNs in the January 1982 Five Year Defense Plan and long-lead funding has been authorized for a total of eleven TRIDENTs. Funding estimates included in the submarine program are based on the latest experience in ship construction and reflect current Secretary of Defense guidance on anticipated inflation rates. The FY 1983 budget included funding for the tenth TRIDENT submarine plus advance procurement to order critical long-lead ship components for the eleventh and twelfth TRIDENT submarines. The FY 1984 request provides for funding of the eleventh TRIDENT submarine and advance procurement of critical long-lead ship components for the twelfth and thirteenth TRIDENT submarines. The ultimate size of the TRIDENT submarine force has not been determined and will depend on many factors, including:

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(a) assessments of the size and capability of Soviet strategic and antisubmarine warfare (ASW) forces; and (b) possible ceilings on strategic forces negotiated in strategic arms reductions negotiations.

After studying their cost-effectiveness, the Navy has decided to extend the service life of POSEIDON submarines to about 30 years. A basic TRIDENT building rate of one SSBN per year is projected. See TABLE 2 for the TRIDENT construction schedule.

The first seven TRIDENTS are scheduled to be deployed by the end of 1987. If TRIDENT SSBN's were constructed as now projected, the US would have 13 TRIDENT SSBNs with 312 launchers [deleted]. There will then be a noticeable decline of SSBNs, as POSEIDON SSBNs, facing block obsolescence in the 1990s, are retired after about 30 years of service. The force of 31 POSEIDON and 13 TRIDENT SSBNs will contain 808 launchers, an increase from 656 in 1979 in the POLARIS and POSEIDON fleet. [Deleted].*

A total of 570 TRIDENT I missiles would be procured for the first eight TRIDENT submarines, twelve POSEIDON backfits, testing, and spares: 384 to be deployed on TRIDENT and POSEIDON

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* Projections do not reflect impact of strategic arms control agreements.

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TABLE 2: <u>SSBN/SLBM Schedule (for end of FY)</u>

<u>Cumulative Forces After Initial Sea Trials***</u>

	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89
TRIDENT SSBNs*	0	0	0	2							
with TRIDENT I SLBMs	0	0		48							
TRIDENT SSBNs	0	0	0	0							
with TRIDENT II SLBMs**	0	0	0	0							
POSEIDON SSBNs*	0	5	11	12							
with TRIDENT I SLBMs	0	80	128	192			[Deleted]				
POSEIDON SSBNs*	31	26	20	19							
with POSEIDON SLBMs	496	416	320	304							
POLARIS SSBNs*	10	5	0	0							
with A-3 SLBMs	160	80	0	0							

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* Each TRIDENT SSBN with TRIDENT I SLBMs may carry an operational load of up to 192 RVs. The decision as to which RV will be used on the TRIDENT II system has not yet been made. However, studies indicate that TRIDENT II SLBMs on TRIDENT SSBNs could carry [deleted]. Each POSEIDON SSBN with TRIDENT I SLBMs will carry a normal operational load of [deleted] RVs; each POSEIDON SSBN with POSEIDON SLBMs, [deleted]; each of the 16 POLARIS SLBMs carried the equivalent of one independently targetable RV, although each missile dispersed 3 RVs around a single target.

** The first TRIDENT SSBN with TRIDENT II missiles is programmed for an IOC of [deleted].

*** Projections do not reflect impact of strategic arms control agreements.

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submarines and 186 for testing, logistical support, and spares. As a result of the decision to pursue the TRIDENT II missile development and production program, 399 TRIDENT I missiles are not required and were deleted from the program. (See TABLE 3 for characteristics of the TRIDENT I Missile.)

The TRIDENT I flight test program carried out under Project B0003 was completed on July 31, 1979. It consisted of twenty-five flight tests; eighteen missiles were launched from a pad at the Eastern Missile Test Range and seven more from a POSEIDON SSBN. The IOC for the TRIDENT I missile in a backfitted POSEIDON SSBN occurred on October 20, 1979. TRIDENT I missiles are equipped with the MK-4 re-entry vehicle.

TABLE 3: Characteristics of the TRIDENT I Missile

Operational:		
Maximum range at full payload (8 RVs)		[ ]
Maximum range ([deleted] fewer RVs)		
System accuracy (CEP)		[Deleted]
System reliability		[ ]
Maximum re-entry vehicles per missile		8 RVs
Explosive yield per warhead		[ ]
Technical:		
Weight:	Launch weight	[Deleted]
	Throw-weight	
	Re-entry vehicle weight	[ ]
Size of missile:	Length	34.1 feet
	Diameter	74 inches
Guidance		Stellar-aided inertial
Propulsion		Solid fuel

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C. W76 (TRIDENT I) MK-4 Warhead (DOE Program).

The TRIDENT I missile MK-4 re-entry vehicles are equipped with the W76, [deleted]. Developmental testing of the W76 was successfully completed [deleted].

D. TRIDENT II Missile System (PE 63371N).

In October 1981 the President formally approved his Strategic Forces Modernization Program. Part of this decision was to pursue the development of the TRIDENT II with an IOC of 1989. Project B0951 is to achieve these goals. See TABLE 4 for characteristics of the TRIDENT II missile.

TABLE 4: Characteristics of the TRIDENT II Missile*

Maximum range at full payload	[
Maximum range with reduced payload . . .	]
System accuracy (CEP)	
System reliability	[Deleted]
Explosive yield	
Guidance options	[ ]
Propulsion	To be determined
Throw-weight	Solid fuel
	[[Deleted]]

E. TRIDENT II Warhead (DOE Program).

A warhead for the TRIDENT II missile has not yet been chosen. Options being considered by DOE and DOD include [deleted].

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* All figures are conceptual and planning goals which may be revised.

F. <u>Navy Strategic Communications (PE 11402N)</u>.

The Navy Strategic Communications Program is designed to develop reliable, secure, and survivable systems for communications from national command authority to FBM submarines and other force elements. The Shore-to-Ship Communications Systems Project (X1083) is responsible for developing and improving these systems for communications to deployed FBM submarines. In FY 1984 this project will continue to develop equipment for VLF broadcast sites and for towed buoy and buoyant antennas, and various engineering support and development efforts will upgrade the basic survivable and enduring communications network.

TACAMO consists of a fleet of EC-130Q aircraft fitted with an array of communications equipment for receiving emergency action messages from the National Command Authorities and relaying them via a very low frequency (VLF) system to deployed SSBNs. The SSBNs receive the messages by trailing a buoyant cable antenna on the ocean's surface or by a towed buoy receiver [deleted] below the surface. The latter is the primary method since it minimizes the possibility of detection of the antenna by enemy forces. Although a number of surface, airborne, and satellite-based communications systems [deleted] are used on a day-to-day basis to communicate with strategic submarines, TACAMO is considered to be the primary means of communicating with SSBNs in a trans- or post-attack environment.

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The TACAMO Project (X0793) addresses communications site improvement and hardening of the TACAMO airborne communications platform to protect electronic equipment against the effects of electromagnetic pulse (EMP). In FY 1984 this improvement program will continue the TACAMO nuclear vulnerability assessment and the production and installation of improvements for the airborne communications system to increase its effectiveness and reliability.

Currently, TACAMO aircraft maintain a continuous airborne alert in the Atlantic Ocean area. Airborne alert is maintained in the Pacific Ocean area [deleted]. The deployment of TRIDENT SSBNs in the Pacific will increase the size and importance of the Pacific SSBN force, as well as the deployment area to be covered by TACAMO, and require the maintenance of an expanded airborne alert operation. Continuous airborne alert coverage in the Pacific will commence [deleted]. Additional EC-130Q aircraft are planned for procurement to increase the force level to 18 aircraft. A Service Life Extension Program was initiated in FY 1979 to extend the life of older aircraft.

A new airframe to replace the EC-130 in performing the TACAMO mission is being developed under project W1438. The new airframe, designated ECX, would be capable of providing continuous two-ocean coverage, be hardened against electromagnetic pulse effects of a nuclear burst, be able to evade hostile action, and

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have long endurance. The ECX has been structured to permit an IOC in FY 1988. The last two of 14 airframes would be procured in 1989. Procurement of three per year beginning in FY 1985 would allow removal of EC-130Q mission avionics for ECX installation with minimum adverse effect. Engineering design, design reviews, and system integration layout will be accomplished in FY 1984.

G. Extremely Low Frequency Communications Program (PE 11401N).

The Extremely Low Frequency (ELF) program provides for the development of a shore-to-submarine peacetime communications system. It would provide a reliable, secure link from commanders to SSBNs and nuclear attack submarines (SSNs) operating at optimum speeds and depths in operational areas without the necessity of using potentially observable, near surface trailing antennas or buoys. ELF would be a [deleted], low data rate system for day-to-day operations only, since it is vulnerable and not expected to survive in wartime.

The ELF system would consist of 56 miles of antenna in Michigan, with a transmitter at K.I. Sawyer Air Force Base, tied electronically to [deleted] antenna and transmitter at an existing test facility in Wisconsin. In [deleted] operation, the two transmitters would be able to provide communications coverage for [deleted] the Atlantic and Pacific Oceans. In 1981 the President directed that this program proceed. IOC is planned for FY 1985. The FY 1984 program will continue full scale development, begin production of prototype submarine receivers, and complete the Wisconsin site upgrade.

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H. <u>UGM-73A (C-3) POSEIDON Maintenance and Modification Procurement</u>.

Although POSEIDON missiles are no longer in production, funds are required to sustain support of the POSEIDON weapon system. In FY 1984 a new nose cone exchange program will be completed and alteration of the motor nozzle will begin.

III. STATED MILITARY REQUIREMENTS

All ten POLARIS submarines have been withdrawn from the strategic mission at about the end of their designed 20-year life span, and the existing POSEIDON SSBN fleet is aging. The originally designed 20-year life span of POSEIDON has been extended to about 30 years. The TRIDENT SSBN program is intended to assure that the US retains a highly survivable sea-based strategic force far into the future based on foreseeable edvances in Soviet ASW capabilities.

US policy is to deter war by maintaining credible conventional and nuclear forces that present unacceptable risks to an aggressor contemplating violence at any level. To be a credible deterrent, US conventional and nuclear forces must be manifestly capable of denying the objectives of any potential aggressor. US nuclear stratagy requires that US nuclear forces must be capable, regardless of circumstances, of surviving a Soviet first strike with sufficient forces remaining to retaliate effectively. Thus, the US requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of holding at risk those things that the Soviet leadership values

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most highly -- military and political control, nuclear and conventional military assets, and industrial capability to sustain war.

The SSBN/SLBM programs provide for systems which, while at sea, are highly survivable elements of US strategic forces and thus provide an important and credible element to our nuclear deterrent. These programs are intended to maintain the survivability of US strategic submarines and to provide increased capabilities for these forces. Such steps to improve sea-based retaliatory capabilities are particularly important in view of the current strategic imbalance with the Soviet Union and the increased capability of Soviet strategic forces against present US strategic forces.

The ELF program and the TACAMO improvement program will provide more secure, reliable communication links from the National Command Authorities to deployed FBM submarines. This will improve US command and control of these nuclear weapon systems while reducing their potential for detection by adversary ASW forces.

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IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Fleet Ballistic Missile System (PE 11221N)										
Development	$ 909.2	32.0	28.9	[						
Production	$9476.2	233.4	352.3							]
TRIDENT I Missile (PE 11228N)										
Development	$3662.8	19.7	2.6							
Production	$5776.5	732.8	529.1			[Deleted]				
TRIDENT II Missile (PE 63371N)										
Development	$ 383.4	339.2	1408.3							
Production	$									
Navy Strategic Communications (PE 11402N)										
Development	$ 89.2	69.3	99.5							
Production	$ 235.3	45.1		[						]

IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Extremely Low Frequency Communications (PE 11401N)										
Development	$ 178.3	49.8	54.3							
Production	$									
W76 TRIDENT Warhead (DOE Program)										
Development	[				[Deleted]					]
Production	[									]
TRIDENT Submarine (Procurement)										
Development	$ 789.2	54.3	71.6	[ ] [Deleted]						
Production	$6479.3	1870.9	2197.5	[ ]						
POSEIDON Missile (Procurement)										
Development	$									
Production	$2416.5	9.7	1.0	[		[Deleted]		]		

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IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
ECX (TACAMO) (Procurement)										
Development	$ 1.9	41.6	71.4	[						
Production	$		159.0							]
POSEIDON Modifications (Procurement)						[Deleted]				
Development	$									
Production	$ 220.4	7.5	10.1	[						]

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Equitable and verifiable arms reduction agreements, when combined with sound foreign and defense policies, can play a critical role in enhancing deterrence and ensuring a stable military balance. The President has outlined the objectives of US arms control policy as follows: Reduce significantly the size and destructive potential of nuclear arsenals; seek agreements which will lead to equal levels of forces on both sides; seek agreements which enhance US and Allied security and reduce the risk of war; and insist on verification measures to ensure compliance with the provisions of arms control agreements.

At the same time, the strategic forces modernization program is necessary to correct imbalances created by a unilateral US constraint and an enormous Soviet military investment and deployment of new generations of strategic systems. The modernization program will establish a deterrent that is more secure and stable than exists today and will thus provide the incentives necessary for the Soviets to respond seriously to proposals for equitable and verifiable reductions in arms.

As currently planned, the introduction of TRIDENT submarines begun in FY 1981 would result in an increase in the numbers of strategic sea-based ballistic missile warheads [deleted]

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[deleted].* The modernization of the US sea-based strategic forces is consistent with the US policy of restoring the strategic balance, enhancing stability through survivability, and creating incentives for the Soviets to enter into meaningful negotiations for arms limitation treaties. [Deleted] expected increases in the number of Soviet strategic nuclear warheads in the absence of strategic arms constraints.

B. <u>Relation to Arms Control Agreements</u>.

The policy of the Administration is not to undercut existing strategic arms agreements so long as the Soviet Union shows equal restraint. This policy may contribute to an atmosphere of stability while the US attempts to achieve more meaningful agreements that will reduce the number of nuclear weapons and enhance our national security.

1. <u>SALT I Interim Agreement</u>.

When the 1972 Interim Agreement expired, both the US and the USSR stated their intentions to take no action inconsistent or incompatible with Interim Agreement provisions as long as the other side does the same, although neither party has a legal

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* Projections do not reflect impact of strategic arms control agreements.

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obligation to do so. The expired Agreement placed restrictions on the number of ballistic missile submarines and SLBM launchers that could be deployed by each side.* The US has dismantled three older POLARIS submarines under these restrictions to compensate for launchers on TRIDENT SSBNs. The Soviet Union has dismantled [deleted] launchers on older ballistic missile submarines to compensate for launchers on new DELTA and TYPHOON SSBNs in order to meet these restrictions.

[Deleted].

2. SALT II Agreement.

The SALT II Agreement was signed in June 1979, but it has not been ratified. The position of the Administration is that SALT II is a flawed agreement and not a sound foundation for long-term arms control. Therefore, ratification will not be pursued. However, it is current US policy to take no action

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* Under the Interim Agreement, the US was limited to 710 SLBM launchers on 44 SSBNs while the Soviet Union was limited to a maximum of 950 SLBM launchers on 62 SSBNs. However, in reaching these levels, the sides agreed to dismantle an older ICBM or SLBM launcher for each new SLBM launcher beyond specified initial thresholds--for the United States 656; for the Soviet Union 740.

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which would undercut existing strategic arms agreements, provided the Soviets exercise equal restraint.

The SALT II Agreement called for an initial aggregate ceiling of 2400 on strategic nuclear delivery vehicles (SNDVs) -- ICBM launchers, SLBM launchers, air-to-surface ballistic missiles (ASBMs) capable of a range in excess of 600 kilometers, and heavy bombers -- which were to be reduced to 2250 by the end of 1981. A subceiling of 1320 was placed on the combined total of MIRVed ICBM and SLBM launchers, MIRVed ASBMs, and heavy bombers carrying long-range* cruise missiles. A second subceiling of 1200 was placed on the combined total of MIRVed ICBM launchers and SLBM launchers as well as MIRVed ASBMs. A third subceiling of 820 was placed on MIRVed ICBM launchers alone. Unlike the SALT I Interim Agreement, there were no separate limits on numbers of ballistic missile submarines under SALT II. At present, the US has a combined total of 2273 SALT-accountable strategic delivery vehicles (1944 of which are operational):** 1053 ICBMs (550 MINUTEMAN IIIs, 450 MINUTEMAN IIs, and 53 TITAN IIs), 656 SLBM launchers (112 POLARIS, 304 POSEIDON, and 240 TRIDENT) and 564 heavy bombers

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* Greater than 600 KM.

** Three POLARIS submarines have been dismantled and seven are still operational but have been removed from a strategic role. The latter are, however, still counted under SALT accountable totals.

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including 238 aircraft in storage.* Thus, the US is below the 2400 aggregate ceiling on launchers and the other subceilings.**

The US made clear that the SALT II Agreement would not affect existing patterns of collaboration and cooperation with its Allies, nor would it preclude cooperation in the modernization of Allied forces. The US specifically stated that the transfer of weapons systems numerically limited by the SALT II Agreement was not necessarily precluded by the Agreement. The US plans to sell the UK Government sufficient missiles complete with multiple independently targetable re-entry vehicles (carrying British-built warheads) on a continuing basis to maintain a force of four or possibly five new British built submarines that would replace the existing British POLARIS sea-based strategic missile force in the early 1990s.

3. TRIDENT and the Non-Proliferation Treaty.

Article VI of the Non-Proliferation Treaty (NPT), to which the US, USSR, and 117 other countries are parties, states:

> "Each of the parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament . . ."

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* These figures reflect the dismantlement of three POLARIS SSBNs and the conversion of twelve POSEIDON SSBNs for TRIDENT I missiles.

** The Soviet Union with over 2500 SALT-accountable strategic nuclear delivery vehicles (SNDVs) would have to dismantle or destroy over 250 SNDVs to get beneath the reduced aggregate ceiling of 2250.

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Representatives of many nonnuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to foreswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapons state parties.

As President Reagan emphasized in his policy statement of July 16, 1981, the US is committed to preventing the spread of nuclear weapons to additional countries. The US strongly supports adherence to the NPT and seeks to reduce the motivations for acquiring nuclear explosives by improving regional and global stability and addressing the legitimate security concerns of other states.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT, and is now participating in Intermediate-Range Nuclear Forces (INF) and START negotiations. As part of the 1979 two-track INF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on INF. The US and the USSR began the negotiations on November 30, 1981, in Geneva, Switzerland. On June 29, 1982, the US and Soviet Union began START negotiations -- also in Geneva. The US held intensive consultations with its Allies in preparation for these negotiations.

Despite such efforts, many of the nonaligned nations argue that there has been an intensification of the US-USSR

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nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. For this reason, the 1980 Review Conference was unable to achieve a consensus on a final declaration. The nonaligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint would weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

The TRIDENT SSBN/SLBM programs could be constrained by other existing arms control agreements. In 1974, the United States and the Soviet Union signed the Threshold Test Ban Treaty (TTBT), which prohibits underground nuclear weapon tests above 150 kilotons. Neither party has ratified this treaty; however, in 1976, both the US and the USSR stated that they would observe the 150 KT threshold pending the treaties' entry into force, providing the other also did so. There are serious questions relating to Soviet observance of the 150 KT limit, as well as to the ability of the US to verify Soviet observance. US policy on nuclear weapons

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testing limitations is to continue observing the 150 KT limit while attempting to improve the verification protocol of the TTBT. [Deleted].

C. Effect on Current and Prospective Negotiations.

1. START Negotiations.

On November 18, 1981, President Reagan announced that the US would seek to negotiate significant reductions in nuclear arms which would result in levels that are equal and verifiable. On May 9, 1982, the President announced a two-phased US approach to the Strategic Arms Reduction Talks. In the first phase of negotiations, the US seeks to reduce the number of warheads on deployed strategic ballistic missiles by about one-third, to 5,000 on each side. No more than half the remaining strategic ballistic missile warheads would be on land-based missiles. The US also seeks to cut the total number of deployed strategic ballistic missiles on each side to an equal level of 850, about one-half of the current US level. In the second phase of negotiations, the US will seek further reductions in overall destructive power of each side's arsenals to equal levels, including a mutual ceiling on strategic ballistic missile throw-weight below the current US level.

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The President's proposal attempts to reduce the threat of nuclear war by enhancing deterrence and securing a stable nuclear balance. The main threat to the strategic balance has been the massive Soviet build-up of its strategic ballistic missile forces. Because of their large size, increasing accuracy, and short flight times, Soviet ballistic missiles (and particularly land-based ICBMs) pose a significant threat to US deterrent forces.

To enhance deterrence and ensure a stable nuclear balance, the President's proposal focuses, in the first phase, on significant reductions in strategic ballistic missile warheads and deployed ballistic missiles themselves. (See TABLE 5.) This would halt and reverse the destabilizing trend which would have been permitted under the SALT II Treaty, if it were ratified.

In the second phase, the US seeks further reductions to equal ceilings on other elements of strategic forces, including ballistic missile throw-weight. Throw-weight is an important measure of the size and destructive potential of ballistic missiles. First phase reductions will reduce the current disparity in ballistic missile throw-weight, and lay the ground work to achieve an equal throw-weight ceiling below current US levels in the second phase.

This approach would lead to significant reductions on both sides and a stable nuclear balance, which should be in the interest of both the US and USSR. Under a ceiling of 5,000 strategic

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ballistic missile RVs as envisioned by the US START proposal, the US would have sufficient weapons to meet its strategic retaliatory requirements.

TABLE 5: Proposed Reductions - START

FIRST PHASE		US	USSR
Deployed Ballistic Missile Warheads (Land-Based and Sea-Based)			
	Approximate current levels. .	7,200	7,500
	Proposed START ceiling . . .	5,000	5,000
Deployed Land-Based Ballistic Missiles Warheads			
	Approximate current levels. .	2,150	5,900
	Proposed ceiling	2,500	2,500
Deployed Ballistic Missiles (Land-Based and Sea-Based)			
	Approximate current levels. .	1,600	2,350
	Proposed ceiling	850	850
SECOND PHASE			
Missile Throw-Weight			
	Approximate current levels .	2 MKG	5 MKG
	Proposed ceiling	below current US levels	

3. Comprehensive Test Ban Treaty.

A Comprehensive Test Ban (CTB) continues to be a long-term objective of US arms control policy. However, there are serious concerns about the national security implications of CTB under current circumstances, including our ability to verify Soviet compliance with such an agreement. It should be recognized

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that nuclear testing plays a very important role in ensuring a credible US nuclear deterrent. The United States uses nuclear testing to develop new nuclear weapons, to confirm the reliability of stockpiled weapons, to improve the safety and security of weapons against accidental or unauthorized detonation, and to assess the vulnerability of military systems to nuclear effects. For these reasons, the President has decided not to resume the trilateral (US, USSR, UK) CTB negotiations initiated under the previous Administration, but suspended since November 1980. However, the US will continue to participate in discussions on ways to improve verification and compliance related to nuclear testing issues in a special working group of the Committee on Disarmament in Geneva.

D. Effect on Global and Regional Stability.

The TRIDENT submarine, missile, and related programs will significantly enhance the military capability and maintain the survivability of US SSBN/SLBM forces. Deployment of the more capable TRIDENT II missiles in the 1990s will help to compensate for the declining number of submarines as older POSEIDON submarines are retired. TRIDENT SSBNs, POSEIDON SSBNs equipped with TRIDENT missiles, associated warhead programs, and related communications upgrade programs should assure that the US continues to maintain a credible, survivable sea-based strategic retaliatory force, even taking into account foreseeable developments in Soviet ASW capabilities. Because of the greater range of TRIDENT missiles,

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US strategic submarines have available many times more ocean operating area. This, combined with improvements in speed and quietness, would make the TRIDENT even more survivable against Soviet ASW forces than are existing SSBNs, which already possess an extremely high degree of survivability. No impending Soviet ASW development seems likely to pose a significant threat to TRIDENT.

By preserving the survivability and enhancing the capability of the US deterrent, our TRIDENT program, in conjunction with other force modernization plans, will increase the confidence of US Allies in the readiness and ability of the United States to react to the modernization of Soviet strategic systems and thereby prevent the USSR from obtaining a perceived or real strategic advantage that could undermine the credibility of the US deterrent.

In the future, US SSBNs could come to assume increasing importance in guaranteeing the secure US retaliatory capability necessary to deter nuclear attack upon this country or its Allies, and to help insure a fundamental strategic stability. Consequently, the TRIDENT SSBN program, the TRIDENT I and II SLBM programs, and the associated SSBN communication improvement programs are essential to US security and to strategic stability.

Deployment of the TRIDENT II missile would complement other programs designed to redress the strategic imbalance. The improved counter-silo and other hard-target capabilities to be

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offered by TRIDENT II will also be useful in meeting our requirements for a credible deterrent in the 1990s, and in providing a hedge against vulnerability of the other legs of the Triad. The survivability of the TRIDENT II SLBM would also enhance crisis stability insofar as it would contribute to an enduring retaliatory force that could inflict damage across the spectrum of Soviet targets.

E. Technological Implications.

Deployment of the TRIDENT II, and/or other US systems with hard-target-kill capabilities, could add incentives for the their to reduce their ICBM vulnerability. By deploying more of their capability at sea, or on mobile ICBMs, the Soviets may improve their strategic force survivability, which, in turn, may enhance strategic and crisis stability, although mobile ICBM deployments could also make verification more difficult. Whether the Soviets would actually respond to the TRIDENT II program with a new SSBN/SLBM or ICBM program would probably depend on a number of factors such as the speed of the US deployment, the cost of such changes to them, and the degree to which they perceived their silo-based ICBMs to be threatened.

F. Potential Interaction with Other Programs.

The strategic modernization program will guide the long-term development of the US strategic forces. It will help redress the deteriorated strategic balance with the Soviet Union. This clear commitment to redress the imbalance should, in turn,

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provide better incentives for the Soviets to negotiate genuine reductions in arms to equal force levels.

G. Verification.

Arms control agreements cannot be based simply on trust alone, particularly with a highly secretive adversary like the Soviet Union. There must be effective means of verification that enable the US to know with confidence whether the terms of agreements are being honored. In practice, this means the US must be able to monitor activities in the areas covered by these treaties in order to detect any violations. Arms control agreements that cannot be effectively verified are not acceptable.

In the past, the US relied primarily on national technical means (NTM) of verification. As arms control agreements, the systems they cover, and the possibilities of concealment become more complex, it may be necessary to supplement NTM with some form of "cooperative" measures of verification. The Reagan Administration has made it clear that the US will insist on effective verfication procedures designed to ensure full compliance with the provisions of any agreement, including the possibility of measures beyond NTM, if necessary, to achieve US objectives.

For treaty purposes, SSBN/SLBMs are counted after the submarines first go on sea trials. Although SSBNs and SLBM launchers are concealed for a part of their life and deployment cycles, they periodically emerge providing an opportunity to

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confirm existing operating numbers. The number of strategic submarines and SLBM launchers can be monitored by Soviet NTM. Thus, neither the TRIDENT SSBN/SLBM nor other US SSBN/SLBM strategic offensive forces will cause verification problems.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The TRIDENT and POSEIDON submarine and missile systems should sustain for the foreseeable future the already high survivability of the US ballistic missile submarine force. The range of the TRIDENT I and II missiles will make available to US strategic submarines far more ocean operating area than is available to SSBNs with POSEIDON SLBMs, and should present a formidable problem to foreseeable Soviet ASW forces. The relatively high survivability of TRIDENT submarines, due to increased operating area, is further enhanced by the improvement in the quietness of their operations. The TRIDENT program will also add to the US retaliatory capabilities deployed to deter a surprise attack.

As currently planned, the introduction of TRIDENT submarines begun in FY 1981 would result in an increase in the numbers of strategic sea-based ballistic missile warheads [deleted].* The modernization of the US sea-based strategic forces is consistent with the US policy of restoring the strategic balance, enhancing stability through survivability, and creating

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* Projection does not reflect impact of strategic arms control agreements.

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incentives for the Soviets to enter into meaningful negotiations for arms limitation treaties. [Deleted] expected increases in the number of Soviet strategic nuclear warheads in the absence of strategic arms constraints.

The TRIDENT II potential for hard-target-kill capability will offset the political and military benefits that the Soviets are attempting to secure by increases in their own hard-target-kill capabilities. Further, it is possible that improvements in US counter-silo capabilities could move the Soviets toward a less destabilizing force configuration. Finally, an increased US hard-target-kill capability would provide the US with an improved and enduring military capability against hard targets in the USSR.

In summary, the SSBN/SLBM and associated communication programs analyzed here have beneficial arms control implications.

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AIRBORNE STRATEGIC OFFENSIVE SYSTEMS

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
11113F	B-52 Squadrons and Associated Procurement
DOE Program	B83 Strategic Bomb
64361F	Air-Launched Cruise Missile (ALCM) and Associated Procurement
DOE Program	The ALCM Warhead Program (W8ø-1)
64738F	Protective Systems (B-52)
64226F	B-1B and Associated Procurement
63258F	Common Strategic Rotary Launcher

These programs are analyzed together because each would contribute to the continued viability of the air-breathing element of the US strategic Triad; consequently, their arms control implications are likely to be similar. Continuous modernization of the airborne component of US strategic forces is intended to maintain the effectiveness and credibility of the US strategic nuclear deterrent. Analysis of these major programs in concert is

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necessary to gain full understanding of their arms control implications, and to reflect developments in Soviet air defense capabilities.

II. PROGRAM DESCRIPTIONS

A. B-52 Squadrons and Associated Procurement (PE 11113F).

This program element consists of several major projects to transition the B-52 force to new missions and maintain its combat effectiveness against projected enemy threats of the 1980s. The purpose of this program element is to fund the B-52 operation, to develop the B-52 cruise missile carriage modifications and to evaluate and develop the weapon system upgrades necessary for maintaining the viability of the B-52 weapon system throughout this decade. These extensive modifications are designed to improve the aircraft's reliability and maintainability, upgrade the bombing navigation system for launching cruise missiles, and reduce weapon system support costs.

The B-52 Aircraft Modernization Program (AMP) is designed to transition the B-52G/H force from a pure penetration to a cruise missile launch mission. The following items are considered minimum requirements for this program: radar system update, new fuel quantity indicating system, and an improved environmental control system. During FY 1984, all major subsets of the AMP will be installed on flight test aircraft and fully involved in a combined development test and evaluation/initial operational test and evaluation program.

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B-52H Cruise Missile Integration provides external and internal cruise missile carriage capability for the B-52H. In FY 1985, test aircraft modification is to be completed, and missile launch will be accomplished. This project will allow production deliveries in FY 1985 and an initial operational capability (IOC) in FY 1986.

B. B83 Strategic Bomb.

The B83 bomb is being developed to modernize the strategic nuclear gravity bomb stockpile. The B83 will upgrade the capability of US strategic aircraft to deliver weapons in high density air defense environments by allowing US strategic aircraft to deliver weapons while flying at high speeds and low altitudes -- flight profiles designed to evade improved Soviet and Warsaw Pact air defenses.

The B83 provides greater flexibility in targeting and employment. It also is designed to be effective against hardened Soviet ICBM silos and launch complexes, command, control and communication installations, and nuclear storage sites. The B83 [deleted] incorporates improved safety and security features. [Deleted]. A modern parachute design will permit the B83 to be dropped at high speed from very low altitudes.

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The B83 is one-point safe,* incorporates improved safety and security features, and will have modern permissive action link (PAL) systems,** and a nonviolent command disable option.*** The use of insensitive high explosive reduces the risk both of accidental detonation of the high explosive and the dispersal of nuclear materials.

[Deleted].

TABLE 1: Cumulative B83 Warhead Deliveries (Projected)

[Deleted]
[ ]

C. Air-Launched Cruise Missile (ALCM) and Associated Procurement (PE 64361F).

The ALCM is a small, unmanned, long-range, accurate weapon which -- in contrast to ballistic missiles -- has an

* One-point safe means that the probability of achieving a nuclear yield greater than four pounds of TNT equivalent shall not exceed one in one million in the event of a detonation initiated at the single most sensitive point in the high explosive system.

** A permissive action link is a command and control device for nuclear weapons employment.

*** The command disable feature cannot be activated until a code is inserted. [Deleted].

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air-breathing engine and is continuously powered through the atmosphere using aerodynamic lift. It incorporates technological advances in a number of areas, including lightweight, highly efficient turbofan engines, miniaturized electronics, modern nuclear warhead design, and advanced guidance systems. The Department of Defense [deleted] and the continuation of associated procurement programs. B-52H aircraft are being modified to carry up to eight ALCMs internally on an enlarged rotary launcher and twelve externally on two new, large pylons mounted under the wings. The B-52G bomber is being modified to carry twelve ALCMs externally. The B-1B bomber could be capable of carrying a maximum of from 20 to 22 ALCMs. However, the actual capability has not been decided.

The ALCM will provide the bomber force with a nuclear-armed air-to-ground missile which can be launched outside of enemy air defenses. It will increase targeting and routing flexibility and reduce bomber exposure to air defenses. Because of its performance characteristics, flight profile, and penetration mode, the cruise missile will present Soviet air defenses with a more diversified threat, thereby preventing the Soviets from concentrating their resources on any one system. The ALCM will increase the air-breathing forces' retaliatory capabilities against a broad spectrum of targets, including hard targets.

Current plans call for the procurement of over 3000 ALCMs to equip the B-52G and B-52H Primary Authorization Aircraft

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(PAA). One deployment concept is to retain initially the current B-52G internal load of bombs and Short-Range Attack Missiles (SRAMs) while loading 12 ALCMs externally on two jettisonable pylons per aircraft. Beginning in FY 1986, cruise missiles will be loaded externally on the B-52H complementing the existing SRAMs and bombs. Future plans include internal loading of ALCMs on the B-52H for a total of 20 missiles each. The first conversion of a non-test B-52G as an ALCM carrier was completed in September 1981. One B-52G squadron equipped with 12 external ALCMs each and the offensive avionics system update attained IOC in December 1982. The ALCM operational and technical characteristics are summarized in Table 2.

D. <u>W80-1 ALCM Warhead (DOE Program)</u>.

The W80-1, [deleted], will be used for the ALCM. The W80-1 incorporates an insensitive high explosive and other improved safety and command and control features. [Deleted] the W80-1 improves the flexibility available to the National Command Authority.

[Deleted].

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TABLE 2: ALCM Operational and Technical Characteristics

	DEVELOPMENT ESTIMATE	APPROVED PROGRAM	CURRENT ESTIMATE
Operational Characteristics (AGM-86B)			
1. Range: System Operational (km) A/	2500	2500	2500
2. Speed (Mach): a. Maximum Penetration b. Cruise B/	[[	Deleted	]]
Technical Characteristics (AGM-86B)			
1. W80-1 Yield (KT)	N/A	N/A	[Deleted]
2. Air Vehicle: a. Weight (lbs.)	N/S C/	N/S	3175
b. Length (in.)	N/S	N/S	249
c. Diameter (in.)	N/S	N/S	27.3

TABLE 3: Cumulative W80-1 Warhead Deliveries (Projected).

[[Deleted]]

A/ System Operational Range takes into account all operational limitations of the system to effectively engage the target (operational fuel, allowance for indirect routing, speed, and altitude variations).

B/ Speed used to achieve System Operational Range.

C/ Not specified.

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E. Protective Systems (PE 64738F).

The purpose of the Protective Systems program is to develop, test and evaluate new countermeasures equipment for strategic aircraft. The FY 1984 program will include funding for: [deleted] derived from these developments will help ensure continued mission effectiveness of the bomber force through the 1980s and 1990s.

F. B-1B Bomber (PE 64226F)

The 1981 Defense Authorization Act directed the Department of Defense to vigorously pursue full scale engineering development of a strategic multirole bomber. As a result of the OSD/Air Force Bomber Alternatives Study, the Administration directed in October 1981 that the B-1B be produced. The B-1B is a mature derivative of the original B-1A aircraft and is, therefore, able to capitalize on much of the work and test results accomplished before that program was terminated.

The B-1B bomber is a strategic multirole weapon system able to perform as a penetrating bomber, a cruise missile launch platform, and conventional weapons delivery system. While the aging B-52s are losing their ability to panetrate Soviet defenses, studies have shown that the bomber force can best realize its mission objectives by presenting a multiplicity of delivery modes, to include gravity bombs, SRAM, and ALCM. The combination of B-1B high penetration speed, low-altitude terrain clearing flight, reduced radar cross-section and advanced electronic countermeasures will provide a flexible, large-payload delivery aircraft capable of penetrating Soviet defenses well into the 1990s.

The B-1B uses the B-1A aerodynamic shape and structure, as well as many of the B-1A systems. The B-1B will have a heavy weight landing gear and will be powered by four F101-GE-102 afterburning turbofan engines which are a direct derivative of the F101-GE-100 engines used on the original B-1A. The avionic

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systems are updated to accommodate revised B-1B missions, counter new threats, and employ currently available equipment and technology. The communications and traffic control group remains essentially the same as B-1A aircraft 4, except current inventory replacements and AFSATCOM are used. The offensive systems group maximizes the use of B-52 Offensive Avionics System (OAS) equipment as well as adding a new Forward Looking Radar/Terrain Following Radar and a new inertial system. The defensive systems group improves on the capabilities of the ALQ-161 and adds jamming enhancements and a Tail Warning System.

The FY 1984 B-1B program will continue emphasis on flight tests, full-scale development and production efforts. Ten B-1Bs will be procured in FY 1984 along with long-lead materials for subsequent production. The B-1B initial operational capability is projected for October 1986 when 15 B-1Bs are to have been delivered to the Strategic Air Command. The 100th aircraft is scheduled for delivery in June 1988. The B-1B operational characteristics are summarized in Table 4.

G. Common Strategic Rotary Launcher (PE 63258)

The Common Strategic Rotary Launcher (CSRL) is being developed for potential use on the B-52H, B-1B and the Advanced Technology Bomber (ATB). The CSRL, a multipurpose, modular concept launcher, offers a design compatible with the B-52H, B-1B, and ATB concepts, reducing the possible five or more launcher development and modification programs. The support equipment for the CSRL will be essentially common for all three bombers as well, with unique adaptors required in some cases. The CSRL will include the capability to incorporate [deleted].

The CSRL program continues full-scale development activity with software design, instrumentation, modification of

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TABLE 4: B-1B Operational Characteristics

		DEVELOPMENT ESTIMATE	APPROVED PROGRAM	CURRENT ESTIMATE
1.	Range (NM)			
	Penetration Mission A/	[		]
	Conventional Mission B/	[	Deleted	]
2.	Sustained Speed (Design Mach) at:			
	Altitude	.7	.7	.7
	Low Altitude	.85	.85	.85
3.	Takeoff Distance (Feet) Std-day			
	SL (Ground Role)			
	Design Gross Weight (395,000)	[		]
	Maximum Gross Weight (477,000)	[	Deleted	]
4.	Payload (Maximum)			
	SRAM (Int)	24	24	24
	ALCM (Int/Ext) C/	8/12-14	8/12-14	8/12-14
	MK-82 (Int)	84	84	84
	B61 (Int)	24	24	24

A/ [Deleted].

B/ [Deleted].

C/ [Deleted].

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the B-1B, and flight testing in FY 1984 for the B-52H and in FY 1986 for the B-1B. CSRL production model deliveries are planned to begin in FY 1986.

III. STATED MILITARY REQUIREMENTS

US policy is to deter war by maintaining credible conventional and nuclear forces that present unacceptable risks to a potential aggressor contemplating violence at any level. To be credible, US conventional and nuclear forces must be manifestly capable of denying the objectives of any potential aggressor. US nuclear strategy requires that US nuclear forces must be capable, regardless of circumstances, of surviving a Soviet first strike with sufficient forces remaining to retaliate effectively. Thus, the US requires survivable, enduring forces and supporting command, control, communications and intelligence (C^3I) capable of holding at risk those things that the Soviet leadership values most highly -- military and political control, nuclear and conventional military assets, and the industrial capability to sustain war.

In order to carry out this policy the US relies on the flexible and diverse capabilities provided by a mix of strategic delivery vehicles: land-based intercontinental ballistic missiles, submarine-launched ballistic missiles, and long-range manned bombers. This strategic force structure severely complicates Soviet offensive and defensive planning and provides a hedge against Soviet technological breakthroughs or the catastrophic

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failure of any one element of the Triad to perform its assigned wartime missions. The complementary and mutually reinforcing character of these strategic forces enables US officials to maintain a high level of confidence in the US strategic deterrent posture.

The airborne element of US strategic forces possesses advantages which are not offered by the other legs of the Triad. Owing to their flexibility, manned bombers have the potential to seek out and hold at risk mobile or imprecisely located targets, including such high value Soviet assets as command and control facilities and mobile ballistic missiles. Since they are recallable, they also can respond to ambiguous tactical warning of Soviet attack. Finally, because of their slow speed to target, manned bombers are not first strike weapons. This slow speed and their ability to survive a surprise first strike make them a stabilizing factor in the strategic balance.

The US intends to rely on a mixed force of penetrating bombers and stand-off bombers with cruise missiles to maintain the effectiveness of the air-breathing forces against future Soviet air defenses. These Soviet defenses, which are not limited by current arms control agreements, are expected to include large numbers of low-altitude-capable, quick-reaction SAMs and look-down/shoot-down interceptors integrated with an advanced Soviet AWACS and a netted ground control intercept system capable of vectoring interceptors to targets.

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The US is continuing the research and development of more advanced penetrating bombers [deleted] to offset expected improvements in Soviet air defenses. These include R&D and technology programs to improve penetration capability of bombers [deleted] throughout the 1980s and beyond.

The Defense Department has projected a requirement that some (if not all) B-52G aircraft be equipped to carry 12 cruise missiles per aircraft and all B-52H aircraft be equipped to carry up to 20 ALCMs per aircraft. The B-1B could be able to carry a maximum of from 20 to 22 ALCMs. The actual capability, however, has not been decided. This combination will ensure the continued viability of the air-breathing forces in the threat environment postulated for the next ten to 15 years. In order to meet the more demanding requirements generated by projected improvements in Soviet air defenses, the Defense Department is providing for the development of an advanced technology bomber for deployment in the early 1990s. It is expected that the ATB will be capable of penetrating all existing and projected Soviet air defenses until well past the turn of the century. Thus, if the threat dictates, the ATB would assume the bulk of the penetration role while the B-1B, equipped with ALCM, could perform the stand-off mission. As the ATB is deployed in substantial numbers and the remaining B-52Gs are retired from the strategic nuclear role, the B-1B may carry an increasingly higher proportion of ALCMs in its weapons mix.

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The introduction of long-range cruise missiles will improve the routing flexibility of the strategic bomber force. The ALCM's effective stand-off range permits coverage of many targets outside the envelope of current Soviet air defenses, thereby improving overall strategic bomber force effectiveness by providing a capability for local exhaustion, saturation and leakage through Soviet low-altitude area and point defense. ALCMs could also increase recoverability of bomber assets -- which would contribute to the reconstitution of an enduring reserve force for use in a post-attack environment.

The accuracy of the ALCM and the modernization of high yield gravity weapons will also contribute to overall US force effectiveness and flexibility by improving bomber force capabilities against the increasing hardness of the Soviet target base. The ALCM's combination of yield and accuracy could make it a flexible weapon for selective attacks against a wide range of fixed non-time-urgent military targets.

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IV. FUNDING ("then year" $ in millions)

	FY 82& Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
<u>B-52 Squadrons and Associated Procurement (PE 11113F)</u>										
Development $	421.9	90.0	95.4	44.8	cont.	N/A				
Production $	3190.4	831.4	1025.4	1229.2	cont.	N/A		N/A	N/A	cont.
<u>B83 Strategic Bomb (DOE Program)</u>										]
Development $	[				Deleted					]
Production $	[									
<u>Air-Launched Cruise Missile (ALCM) and Associated Procurement. (PE 64361F)</u>										
Development $	1082.5	19.5	29.8	30.2	86.2	1248.2				
Production $	1737.1	646.0	92.2	84.4	266.2		2825.9			cont.

IV. FUNDING (Con't) ("then year" $ in millions)

	FY 82& Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
The ALCM Warhead Program (W80-1) (DOE Program)										
Development $	[									
Production $	[				Deleted					]
B-52 Protective Systems (PE 64738F)										]
Development $	67.4	66.6	18.2	12.8	cont.	N/A				
Production $			83.0	114.0	355.0		552.0	96	4.42	cont.
B-1B Bombers (PE 64226F)										
Development $	690.0	753.5	773.3	506.4	450.5	3173.7				
Production $	1612.0	4033.5	5954.1	7432.2	6967.8		26,629.6	100	260.3	29,203.3
Common Strategic Rotary Launcher (PE 63258F)										
Development $	21.9	64.1	59.1	52.0	75.0	271.1				
Production $		22.4	140.0	121.0	266.0		549.0	103	5.3	820.1

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Equitable and verifiable arms control agreements, when combined with sound foreign and defense policies, can play a critical role in enhancing deterrence and ensuring a stable military balance. The President has outlined the objectives of US arms control policy as follows: Reduce significantly the size and destructive potential of nuclear arsenals; seek agreements which will lead to equal levels of forces on both sides; seek agreements which enhance US and allied security and reduce the risk of war; and insist on verification measures to ensure that both sides comply with the provisions of arms control agreements.

At the same time, the strategic forces modernization program is necessary to correct imbalances created by a unilateral US restraint and an enormous Soviet military investment and deployment of new generations of strategic systems. The modernization of the B-52, the procurement of the B-1B, the deployment of air-launched cruise missiles, and the development of advanced aircraft technologies contribute to the continued viability of the bomber element of the strategic Triad. The modernization program will establish a deterrent that is more secure and stable than exists today and could provide the incentives necessary for the Soviets to respond seriously to proposals for equitable and verifiable reductions in arms.

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B. <u>Relation to Arms Control Agreements</u>.

The policy of the Administration is not to undercut existing strategic arms agreements so long as the Soviet Union shows equal restraint. This policy may contribute to an atmosphere of stability while the US attempts to achieve more meaningful agreements that will reduce the number of nuclear weapons and enhance our national security.

1. <u>SALT II Agreement</u>.

The SALT II Agreement was signed in June 1979, but it has not been ratified. The position of the Administration is that SALT II is a flawed agreement and not a sound foundation for long-term arms control. Therefore, ratification will not be pursued. However, it is current US policy to take no action which would undercut existing strategic arms agreements, provided the Soviets exercise equal restraint.

The provisions of the SALT II Agreement included a 1320 limit on the combined total of launchers of MIRVed (multiple independently targetable reentry vehicle) strategic ballistic missiles, MIRVed air-to-surface ballistic missiles (ASBMs), and heavy bombers equipped with cruise missiles capable of a range in excess of 600 km. Of this total of 1320, no more than 1200 could be launchers of MIRVed missiles and ASBMs. This would have allowed deployment of 120 heavy bombers equipped with cruise missiles capable of ranges greater than 600 km, without any offsetting reductions in launchers of MIRVed ballistic missiles

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and ASBMs; a larger number of aircraft equipped with long-range cruise missile launchers and ASBMs could be deployed if fewer than 1200 MIRVed ballistic missile launchers and ASBMs were deployed.

Under the provisions of the SALT II Agreement, any deployment of aircraft equipped with ALCMs capable of a range in excess of 600 km would be counted against the SALT overall ceiling limits and the sublimits on MIRVed missile launchers and heavy bombers equipped with cruise missiles. Aircraft on which long-range ALCMs are deployed would be counted as heavy bombers in both the 2250 aggregate ceiling for strategic delivery vehicles and the 1320 subceiling on the total of MIRVed missile launchers, ASBMs and heavy bombers equipped for long-range cruise missiles. These limitations would have applied to all weapon-delivery (nuclear or conventional) ALCMs capable of ranges in excess of 600 km. According to the Second Agreed Statement to Article IV. 14 of the SALT II Agreement, no bomber of the B-52 or B-1 types and no bomber of the TU-95 or Myasishchev types would be equipped for more than 20 cruise missiles capable of a range in excess of 600 km.

One additional element of the SALT II Agreement is the Joint Statement of Principles and Basic Guidelines for subsequent Negotiations on the Limitation of Strategic Arms. In the Joint Statement of Principles, both Parties agreed to pursue the following objectives in future negotiations, taking into consideration factors that determine the strategic situation: (1) significant

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and substantial reductions in the number of strategic offensive arms; (2) qualitative limitations on strategic offensive arms, including restrictions on the development, testing, and deployment of new types of strategic offensive arms and on the modernization of existing strategic arms; and (3) resolution of the issues included in the Protocol to the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms in the context of the negotiations relating to the implementation of the principles and objectives set out therein.

2. The Non-Proliferation Treaty (NPT).

Article VI of the Non-Proliferation Treaty, to which the US, USSR, and 117 other countries are parties, states:

> "Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,..."

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon-state parties.

As President Reagan emphasized in his policy statement of July 16, 1981, the US is committed to preventing the spread of nuclear weapons to additional countries. The US strongly supports adherence to the NPT and seeks to reduce the motivations for acquiring nuclear explosives by improving regional and global

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stability and addressing the legitimate security concerns of other states.

In keeping with Article VI, the US has participated in a number of arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT, and is now participating in Intermediate-Range Nuclear Forces (INF) and START negotiations. As part of the 1979 two-track INF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on INF. The US and the USSR began the negotiations on November 30, 1981, in Geneva, Switzerland. On June 29, 1982, the US and USSR began START negotiations -- also in Geneva. The US held intensive consultations with its Allies in preparation for these negotiations.

Despite such efforts, many of the nonaligned nations argue that there has been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments have been contrary to Article VI. For this reason, the 1980 Review Conference was unable to achieve a consensus on a final declaration. The nonaligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapon states for lack of

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arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

3. The Threshold Test Ban Treaty (TTBT).

In 1974, the United States and the Soviet Union signed the Threshold Test Ban Treaty (TTBT), which prohibits underground nuclear weapon tests above 150 kilotons. Neither party has ratified this treaty; however, in 1976, both the US and the USSR stated that they would observe the 150 KT threshold pending the treaty's entry into force, providing the other also did so. There are serious questions relating to Soviet observance of the 150 KT limit as well as the ability of the US to verify Soviet observance. The TTBT would [deleted]. Testing is carried out in compliance with tne 1963 Limited Test Ban Treaty.

The programs analyzed in this ACIS are not affected by any other existing arms control treaty or obligation.

C. Effect on Current and Prospective Negotiations.

1. Strategic Arms Reduction Talks.

On November 18, 1981, President Reagan announced that the US would seek to negotiate significant reductions in

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nuclear arms which would result in levels that are equal and verifiable. On May 9, 1982, the President announced a two-phased US approach to the Strategic Arms Reduction Talks. In the first phase of negotiations, the US seeks to reduce the number of warheads on deployed strategic ballistic missiles by about one-third, to 5,000 on each side. No more than half the remaining strategic ballistic missile warheads would be on land-based missiles. The US also seeks to cut the total number of deployed strategic ballistic missiles on each side to an equal level of 850, about one-half of the current US level. [Deleted]. The emphasis on ballistic missiles in the first phase reflects the fact that such systems are the most destabilizing. In the second phase of negotiations, the US will seek further reductions in overall destructive power of each side's arsenals to equal levels, including a mutual ceiling on strategic ballistic missile throw-weight below the current US level. The US proposal does not include specific limits on bombers and cruise missiles but the US has indicated that such limits could be included in the second phase.

The President's proposal attempts to reduce the threat of nuclear war by enhancing deterrence and securing a stable nuclear balance. The main threat to the strategic balance has been the massive Soviet buildup of its strategic ballistic missile forces. Because of their large size, increasing accuracy, and

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short flight times, Soviet ballistic missiles (and particularly land-based ICBMs) pose a significant threat to US deterrent forces.

To enhance deterrence and ensure a stable nuclear balance, the President's proposal focuses, in the first phase, on significant reductions in strategic ballistic missile warheads and deployed ballistic missiles themselves. (See Table 5.) This would halt and reverse the destabilizing trend which would have been permitted under the SALT II Treaty, if it were ratified.

In the second phase, the US seeks further reductions to equal ceilings on other elements of strategic forces, including ballistic missile throw-weight. Throw-weight is an important measure of the size and destructive potential of ballistic missiles. First phase reductions will reduce the current disparity in strategic ballistic missile throw-weight and lay the groundwork to achieve an equal throw-weight ceiling below current US levels in the second phase.

This approach would lead to significant reductions on both sides and a stable nuclear balance, which should be in the interest of both the US and USSR. Under a ceiling of 5,000 strategic ballistic missile RVs as envisioned by the US START proposal, the US would have sufficient weapons to meet its strategic retaliatory requirements.

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TABLE 5: Proposed Reductions - START

	US	USSR
FIRST PHASE		
Deployed Ballistic Missile Warheads (Land-Based and Sea-Based)		
Approximate current levels . .	7,200	7,500
Proposed START ceiling	5,000	5,000
Deployed Land-Based Ballistic Missile Warheads		
Approximate current levels . .	2,150	5,900
Proposed ceiling	2,500	2,500
Deployed Ballistic Missiles (Land-Based and Sea-Based)		
Approximate current levels . .	1,600	2,350
Proposed ceiling	850	850
SECOND PHASE		
Missile Throw-Weight		
Approximate current levels . .	2 MKG	5 MKG
Proposed ceiling	below current US levels	

2. Comprehensive Test Ban Treaty.

A Comprehensive Test Ban (CTB) continues to be a long-term objective of US arms control policy. However, there are serious concerns about the national security implications of a CTB under current circumstances, including our ability to verify Soviet compliance with such an agreement. It should be recognized that nuclear testing plays a very important role in ensuring a credible US nuclear deterrent. The United States uses nuclear testing to develop new nuclear weapons, to confirm the reliability

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of stockpiled weapons, to improve the safety and security of weapons against accidental or unauthorized detonation, and to assess the vulnerability of military systems to nuclear effects. For these reasons, the President has decided not to resume the trilateral (US, USSR, UK) CTB negotiations initiated under the previous Administration, but suspended since November 1980. However, the US will continue to participate in discussions on ways to improve verification and compliance related to nuclear testing issues in a special working group of the Committee on Disarmament in Geneva.

D. Effect on Global and Regional Stability.

The improvements envisaged for US airborne strategic offensive forces should contribute to crisis stability. The upgrading of B-52 avionics systems, the deployment of ALCMs, the procurement of B-1B bombers, and the continuing development of advanced aircraft technologies will help to maintain the effectiveness of the US airborne strategic offensive forces in the face of improving Soviet air defenses. Since either penetrating bombers or stand-off aircraft equipped with long-range cruise missiles take at least several hours after takeoff to deliver their weapons on target, such forces clearly are not a first-strike (disarming) threat against the USSR. Their considerable retaliatory capability enhances deterrence, while their slowness of delivery makes them inappropriate for use in any attack against time-urgent targets in the Soviet Union.

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At a time of fixed-silo ICBM vulnerability, the strategic bomber contribution to US retaliatory capabilities has become even more important. It could greatly complicate the Soviets' already formidable air defense problem. Systems based on advanced technologies will enhance the deterrent value of the airborne element of the Triad and thus will have a positive effect on global and regional stability. ALCMs and related programs, by helping to assure the retaliatory capability of the bomber force, will contribute to strategic and crisis stability.

E. Technological Implications.

The United States possesses an advantage in advanced cruise missile technology, with an estimated lead of five or more years over the Soviet Union. ALCM is not a wholly new type of weapon; it represents the integration of a series of improvements in a number of technologies. Nevertheless, development of small highly accurate, long-range cruise missiles with small, high-yield-to-weight nuclear warheads would present formidable technical obstacles to states other than the current nuclear weapon states over the next few years.

If they believed it necessary, the Soviets could respond to US deployment of ALCMs in one or more of the following ways: (1) increasing efforts to deploy a defense against both cruise missiles and their associated launch platforms; (2) accelerating their development of ALCM capability; (3) upgrading their overall existing strategic offensive systems.

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The Soviets could respond to US ALCM and associated bomber programs by accelerating their present modernization of low altitude air defenses. The Soviet SA-10 surface-to-air missile [deleted]. Interceptors with a look-down/shoot-down capability designed to operate with a possible Soviet counterpart to the US AWACS [deleted]

[deleted].

The Soviet Union can also respond to the US ALCM program by developing, testing, and deploying long-range ALCMs and suitable carrier aircraft. It is more likely that the development of a long-range Soviet cruise missile would be in response to Soviet military requirements and not in reaction to the US deployment of ALCMs. [Deleted].

Several US NATO allies have expressed interest in a long-term program of cooperation to develop a stand-off missile for the late 1980s/early 1990s for the defense of Western Europe.

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* These interceptors if deployed in large numbers together with the AWACs will have [deleted].

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The US rejected Soviet attempts to include a nontransfer provision in the SALT II negotiations regarding cruise missiles and other systems limited by the Agreement. A generalized noncircumvention provision was agreed to by the US. The US has previously assured the NATO allies that the SALT II Agreement would neither affect existing patterns of cooperation between the US and its allies, nor preclude cooperation in modernization.

Development of cruise missiles by other nations is likely to be influenced more by internal considerations of strategy, politics, economics, and technology than by prestige considerations, or US actions or inaction. [Deleted]. The United Kingdom has shown interest in long-range cruise missiles as well.

Development of small long-range cruise missiles could present formidable technical obstacles to many other states, and especially developing countries, over the next few years. Although the aerodynamic design and turbofan engine technology are within the technological state of the art for some developed countries, the fabrication of small, lightweight nuclear warheads and the microminiaturization of computer systems would require considerable technological sophistication and economic resources. For countries, however, who intend to use cruise missiles for less demanding missions, the development of relatively unsophisticated cruise missiles could be a more practical alternative.

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F. Potential Interaction With Other Programs.

The strategic modernization program will guide the long-term development of the US strategic forces. It will help redress the deteriorated strategic balance with the Soviet Union. The result will be a deterrent that is far more secure and likely to enhance stability than the present US nuclear force. This should, in turn, create better incentives for the Soviets to negotiate genuine arms reductions.

G. Verification

Arms control agreements cannot be based on trust alone, particularly with a highly secretive adversary like the Soviet Union. There must be effective means of verification that enable the US to know with confidence whether the terms of agreements are being bonored. In practice, this means the US must be able to monitor activities in the areas covered by these treaties in order to detect any violations. Arms control egreements that cannot be effectively verified are not acceptable.

In the past, the US relied primarily on national technical means (NTM) of verification. As arms control agreements, the systems they cover, and the possibilities of concealment become more complex, it may be necessary to supplement NTM with some form of "cooperative" measures of verification. The Reagan Administration has made it clear that the US will insist on verification procedures to ensure full compliance with the provisions of any agreement, including the possibility of measures

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beyond national technical means, if necessary, to achieve US objectives.

Cruise missiles represent a class of weapons that raises complex and difficult verification problems, particularly over the longer term. As a result, as cruise missile programs and technology mature, future arms control agreements will require more detailed and stringent cooperative measures in order to assure adequate verification.

Cruise missiles, when compared to ballistic missiles, are smaller, fly lower, have smaller radar and infrared signatures, can use smaller, simpler and less easily identifiable launchers and support facilities and can be launched from a wide variety of air, sea, and land platforms. Their relatively low cost makes them feasible for the delivery of conventional as well as nuclear weapons. Cruise missiles of similar size and external configuration could have significantly different range capabilities, nuclear or conventional payloads, guidance systems, and missions. Each side would have to overcome difficult problems in order to be able to determine the particular fuel exhaustion range, payload, and launch platform of a given cruise missile. To the degree that such elements are or become the subject of constraints under arms control agreements, verification would become more complicated.

In contrast with US efforts to monitor Soviet cruise missile programs, the open US society affords the Soviets considerable

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advantages in monitoring ALCM development, production, and deployment. The problem of verifying compliance with limits on ALCM carriers is not insurmountable. Many opportunities for monitoring an adversary's cruise missile program over a length of time would exist. Some testing of ALCMs on designated aircraft would be necessary before they could be deployed confidently, thereby allowing opportunities for identifying cruise missile carriers. These judgments are besed on the assumption that [deleted] current US national technical means continue to be available in the future.

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

In the face of improving Soviet air defenses, the procurement of ALCMs and the B-1B while developing advanced technologies is necessary to maintain the effectiveness of the strategic bomber force. The programs described in this statement will improve US retaliatory capabilities and thus strengthen deterrence, enhance crisis stability, and create incentives necessary for the Soviets to respond seriously to US proposals for meaningful strategic arms reductions. At the same time, the strategic bomber force clearly will pose no first-strike threat to USSR strategic forces.

The introduction of ALCMs on B-52s [deleted]

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[deleted]. ALCM deployment must be seen in the light of the need to maintain adequate military capability to execute the national strategy and achieve US national security objectives, to correct the existing strategic force imbalance, and to restore strategic stability consistent with US arms control policy.

The Soviets might respond to US ALCM deployments in a variety of ways, including: (a) further improvements to their air defense system; (b) acceleration of their strategic weapons build-up beyond the scope of present plans; (c) increased willingness to pursue negotiated arms limitations; or (d) some combination of the above. However, without offsetting adjustments in US forces, a US decision unilaterally to restrict cruise missile deployment and new bomber procurement would lead to US strategic forces that were not capable of supporting US national security objectives.

Programs to ensure the continued effectiveness of the airborne strategic offensive force support US arms control and national security goals of deterring nuclear war or coercion, and maintaining international stability through the preservation of a credible threat of assured retaliation. These programs contribute to the reliability, survivability, and penetrativity of the air-breathing element of the strategic Triad and are consistent with US arms control objectives.

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SPACE DEFENSE

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
64406F	Space Defense Systems (Antisatellite)
63438F	Satellite Systems Survivability
63428F	Space Surveillance Technology
12424F	SPACETRACK and Associated Procurement
62301E	Strategic Technology
12450F	Space Defense Operations

The overall capability of the US to defend its assets in space and deny the Soviets the uninhibited use of space depends on the successful implementation of an integrated space defense program. The US programs to accomplish this comprise four major functional areas: (1) antisatellite (ASAT) systems; (2) space systems survivability; (3) space surveillance systems; and (4) command and control. The programs described below would provide for the full gamut of these functions.

II. PROGRAM DESCRIPTIONS

A. Space Defense Systems (PE 64406F).

Under this program, the Air Force is developing a nonnuclear antisatellite capability. The heart of the system is a Miniature Vehicle (MV).

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The MV is small [deleted], and is planned to be launched by an F-15 aircraft carrying a two-stage booster consisting of a modified Short Range Attack Missile (SRAM) first stage and a modified ALTAIR III second stage. The booster will carry the MV by [deleted].* Typical system characteristics are shown in Table 1. The air-launched concept is shown in Figure 1.

Following competitive design review, a contract was awarded in September 1977 for full-scale development and ground testing of prototypes of the MV system. Ground testing of the missile and carrier aircraft began in FY 1982. During FY 1983, [deleted]. System improvements will be studied for future implementation, and post-flight analyses of the flight tests will continue. Target initial operational capability (IOC) for the ASAT system is FY [deleted]. The number of MVs to be procured at IOC remains to be determined.

TABLE 1: Characteristics of the MV

[Deleted]*

---

* Altitudes of satellites are measured from mean sea level.

* [Deleted].

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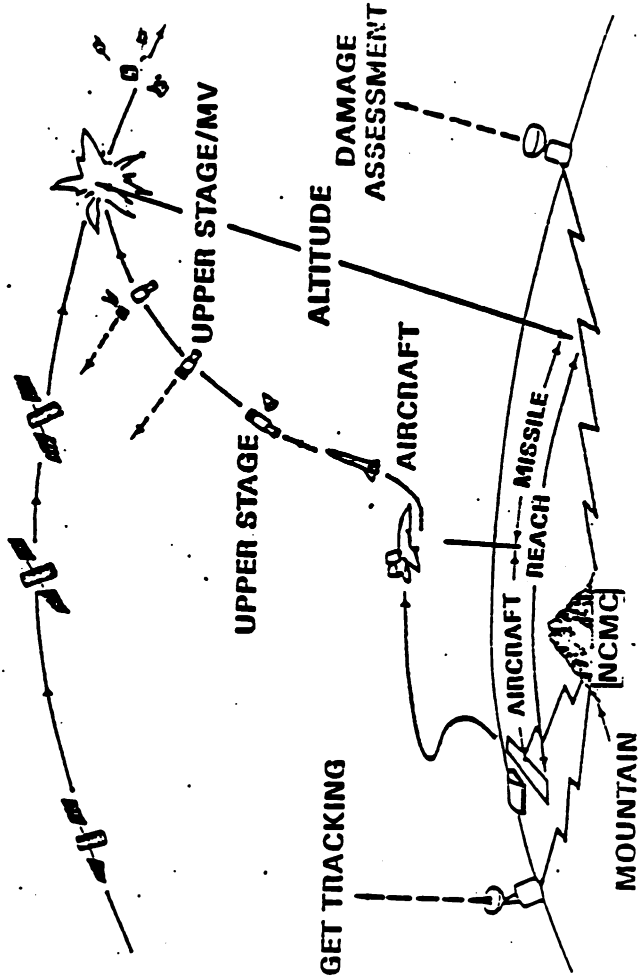
FIGURE 1

AIR LAUNCHED CONCEPT



Baseline planning for the MV ASAT system currently projects deployment of [deleted] modified air-defense F-15 interceptors at two continental US bases. Full operational capability would require approximately [deleted] missiles.

[Deleted].

During FY 1984, the Air Force will also [deleted].

B. Satellite Systems Survivability (PE 63438F).

The objective of this program is to develop technology to enhance the survivability of key US satellites, data links, and ground elements. This program includes: (1) [deleted]; (2) the analysis of satellite system vulnerabilities; and (3) the development of technology for ensuring the survivability of essential telemetry tracking and control links to orbiting satellites and between ground elements.

The FY 1983 planned program continued previous efforts such as the transportable mobile satellite command and control ground station program scheduled for initial operational capability in FY [deleted].

The FY 1984 planned program would continue the development of the transportable mobile satellite command and control ground station [deleted], and would update survivability requirements and implementation plans.

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C. <u>Space Surveillance Technology (PE 63428F)</u>.

This program seeks to improve the SPACETRACK detection and tracking system. The objective is to upgrade the capabilities of this component of the Department of Defense Space Detection and Tracking System for ranges out to geosynchronous altitudes. The various research and development (R&D) tasks involve improving tracking and prediction hardware and software, providing a capability for tactical assessment of satellite missions, developing an attack assessment and warning capability, [deleted]. Following the completion of R&D, these capabilities would be integrated into the operational SPACETRACK system.

The FY 1983 program will further refine space-based surveillance system design, enhancing survivability and endurance. Probe measurements of the earth limb background will be conducted and their results analyzed for application to the [deleted] surveillance system design. FY 1983 funding was reduced by Congress following Air Force termination of the Space Infrared Sensor Program (SIRE). The FY 1984 planned program would continue space-based space surveillance (SBSS) system technology efforts. Background and target signature data acquisition for [deleted] program would be conducted.

D. <u>SPACETRACK (PE 12424F) and Associated Procurement</u>.

The SPACETRACK program will support satellite attack warning and verification, rapid alerting for [deleted]

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[deleted]. The thrust of these efforts is to: (1) provide a Pacific Radar Barrier [deleted]; (2) convert the Defense Advanced Research Projects Agency (DARPA) Maui optical site and Haystack Space Object Identification Facilities to SPACETRACK for operational use; (3) provide improved calibration and extended range capability for selected SPACETRACK radars; and (4) provide a five-site global Ground-based Electro-Optical Deep Space Surveillance (GEODSS) system that could detect and track satellites out to an altitude of approximately 22,000 NM and beyond.

Near-term improvements include the integration of existing space tracking R&D assets into a coherent system, and the development of the ground-based electro-optical surveillance system to increase SPACETRACK detection and tracking altitude from 3,000 NM to approximately 22,000 NM. The operational network, when deployed, would consist of five sites around the world. This includes one in the continental United States which began operating in FY 1982.

The FY 1984 planned program will continue sensor upgrades and data processing, calibration and space object identification modifications. [Deleted].

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E. <u>Strategic Technology (PE 62301E)</u>.

This DARPA program includes two separate technology projects which could, if proved feasible, have direct application in support of the defense mission.

1. <u>High Energy Laser Technology (ST-3)</u>.

This project examines the future [deleted].

2. <u>Space Object Identification (ST-8)</u>.

The space defense related goal of this project is to develop and demonstrate advanced techniques for high payoff capabilities in space object identification. The Compensated Imaging System, for example, was designed to obtain [deleted] on low-altitude satellites in order to assist in determining their function. Funding in FY 1983 and beyond will be applied to evaluation testing, maintenance, and upgrade of the system at the DARPA Maui Optical Station, in cooperation with

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the US Air Force, and to its operation as a national facility for space surveillance.

F. Space Defense Operations and Associated Procurement (PE 12450F).

This program will procure operational ASAT missiles, fund aircraft modifications, and develop the necessary operations and maintenance support facilities to include: (1) a facility for testing, checkout and repair of the ASAT vehicles; (2) a training facility to maintain launch crew proficiency; and (3) additional antisatellite system handling and launch facilities to be installed at selected locations. The FY 1983 planned RDT&E programs would investigate operational deficiencies in the ASAT missiles and make corrections. Procurement and completion of these facilities would depend upon successful demonstration of the prototype ASAT in FY [deleted].

III. STATED MILITARY REQUIREMENTS

The President announced on July 4, 1982, a national space policy that will set the direction of US efforts in space for the next decade. The US will conduct those activities in space that it deems necessary to its national security consistent with international obligations. National security space programs shall support such functions as command and control, communications, navigation, environmental monitoring, warning, surveillance, and space defense.

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The United States' ability to utilize its military power continues to be increasingly dependent on the effective and reliable operation of various satellite systems; the Soviet Union is also expected to be increasingly dependent upon satellites. Space systems provide critical strategic and tactical support to military forces and political leaders in the areas of attack warning, navigation, surveillance, communications, intelligence and meteorology. [Deletad]. Although the US [deleted] some systems with redundant capabilities, not dependent on the use of space, [deleted].

The Soviet Union began to test antisatellite systems in [deleted]

[deleted].

Although [deleted].

A [deleted].

[deleted].

The Soviets [deleted]*.

[Deleted]

* [Deleted].

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[deleted]. (See the separate ACIS [deleted] for further information.)

[Deleted].

The Soviet orbital interceptor [deleted].

The US currently has no operational ASAT system, but did have a [deleted] system deployed at Johnston Island from 1964 until 1975. The system employed THOR boosters and [deleted], and could have operated in a direct ascent mode against low-altitude [deleted] targets only. The Johnston Island system was initially a response to Soviet threats to deploy orbital weapons of mass destruction. The US system was deactivated because the Soviet threat was never operationally deployed (and the Outer Space Treaty prohibited such employment), and because a low-altitude [deleted] would probably damage US satellites large distances away from the burst as well as the targeted Soviet satellite.

The Air Force ASAT system will provide a capability to negate low-altitude Soviet military satellites that directly support Soviet combat forces. It also will give the US a capability to deny unilateral Soviet control or uninhibited use of space. Moreover, it is believed that posing such a threat to Soviet satellites could help deter Soviet use of ASAT systems against US satellites in some situations, such as limited war, in which such Soviet activity might be a real risk.

Although some measures can be taken to reduce US satellite vulnerability, and some satellites are not vulnerable to direct interceptor attack at present because they are in high-altitude orbits beyond the range of the operational Soviet orbital

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ASAT system, it is not possible to make US satellites invulnerable to all forms of attack indefinitely. It is possible through a selective mix of countermeasures to make hostile attacks more difficult, more visible, more costly, and less certain of success. Some measures to improve satellite survivability such as hardening, increased maneuver capability, the use of decoys and chaff, deep space storage, proliferation and other countermeasures would be very expensive. Some survivability measures (e.g., maneuvering to survive) could also degrade satellite performance of primary missions.

[Deleted].

The US system based on the MV technology takes a different approach than the current Soviet orbital interceptor. The Soviets, however, enjoy the advantage of an ASAT system which has been tested and operational for a longer period of time. In the absence of a comparable US system or some form of verifiable negotiated mutual limits on ASAT systems, the Soviet ASAT program provides them with a unilateral military advantage. Such an advantage, even with improved survivability for US satellites, could be detrimental to the US in a theater conflict between the superpowers by providing options to the Soviets that the US could not match.

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IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Space Defense Systems (PE 64406F)										
Development	$ 552.8	211.8	211.5	113.4	Cont.	TBD	N/A	N/A	N/A	TBD
Production	$						N/A			
Satellite Systems Survivability (PE 63438F)										
Development	$ 104.6	22.5	35.1	62.8	Cont.	N/A	N/A	N/A	N/A	Cont.
Production	$						N/A			
Space Surveillance Technology (PE 63428F)										
Development	$ 201.2	20.3	23.2	40.5	Cont.	N/A	N/A	N/A	N/A	Cont.
Production	$						N/A			

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IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
SPACETRACK (PE 12424F)										
Development	$ 41.4	5.5	5.8	7.9	Cont.	N/A	N/A	N/A	N/A	TBD*
Production	$ 80.8	7.7	7.9	20.6	Cont.	N/A	TBD*	N/A	N/A	TBD*
Strategic Technology (PE 62301E)										
Development	$ 155.7	47.5	63.3	33	Cont.	N/A	0	N/A	N/A	Cont.
Production	$									
Space Defense Ops. (PE 12450F)										
Development	$ 15.5	6.5	**	0	Cont	N/A	N/A	N/A	N/A	TBD*
Production	$		19.8	235	Cont.		TBD*	TBD*	TBD*	TBD*

* To Be Determined
** As of FY 84, development in PE 64406 (page 17)

IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
Space Defense Systems (PE 64406F)										
Development	$ 552.8	211.8	211.5	113.4	Cont.	TBD	N/A	N/A	N/A	TBD
Production	$						N/A			
Satellite Systems Survivability (PE 63438F)										
Development	$ 104.6	22.5	35.1	62.8	Cont.	N/A	N/A	N/A	N/A	Cont.
Production	$						N/A			
Space Surveillance Technology (PE 63428F)										
Development	$ 201.2	20.3	23.2	40.5	Cont.	N/A	N/A	N/A	N/A	Cont.
Production	$						N/A			

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IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
SPACETRACK (PE 12424F)										
Development	$ 41.4	5.5	5.8	7.9	Cont.	N/A	N/A	N/A	N/A	TBD*
Production	$ 80.8	7.7	7.9	20.6	Cont.	N/A	TBD*	N/A	N/A	TBD*
Strategic Technology (PE 62301E)										
Development	$ 155.7	47.5	63.3	33	Cont.	N/A	0	N/A	N/A	Cont.
Production	$									
Space Defense Ops. (PE 12450F)										
Development	$ 15.5	6.5	**	0	Cont	N/A	N/A	N/A	N/A	TBD*
Production	$		19.8	235	Cont.		TBD*	TBD*	TBD*	TBD*

* To Be Determined
** As of FY 84, development in PE 64406 (page 17)

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

As part of the national space policy announced by the President on July 4, 1982, the US will continue to study space arms control options. The US will consider verifiable and equitable arms control measures that would ban or otherwise limit testing and deployment of specific weapon systems, should those measures be compatible with US national security. [Deleted]. Current space defense programs are consistent with these goals.

B. Relation to Arms Control Agreements.

The following existing legal obligations impose certain restraints on ASAT activities:

1. The Outer Space Treaty establishes a general norm for peaceful uses of outer space. Article III states that the space activities of States Parties to the Treaty shall be conducted "... in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding." Article IV prohibits the placement in orbit, installation on celestial bodies, or stationing in outer space of nuclear weapons or any other kinds of weapons of mass destruction. In addition, Article IX requires international consultations prior to any planned space activity or experiment if

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the State undertaking it has reason to believe such activity or experiment would cause potentially harmful interference with the peaceful space activities of others.

2. The Limited Test Ban Treaty prohibits the Parties to the Treaty from carrying out nuclear explosions of any kind in space.

3. Other international agreements extend specific protections to certain classes of satellites. The US and the USSR have undertaken express obligations not to interfere with each other's national technical means (NTM)* of verification under the ABM Treaty. Under the Direct Communications Link Improvement Agreement, both nations have confirmed their intention to take all possible measures to assure the continuous and reliable operation of the emergency satellite system; and under the International Telecommunications Convention, each party is obligated to avoid harmful interference with the radio services or communications of other parties.

4. In addition, the prohibition in the UN Charter against the use of force by one State against another (except in legitimate individual or collective self-defense in the event of armed attack, as recognized by Article 51 of the Charter) would of course apply to attacks on space objects. [Deleted]

* However, NTMs are not defined in any international agreement.

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[deleted].

5. Finally, the Convention on Registration of Objects Launched into Outer Space provides cooperative means to monitor some space activities. Parties to the Convention shall provide: (a) name of launching state or states; (b) an appropriate designation of the space object, or its registration number; (c) date and territory or location of launch; (d) basic orbital parameters, including nodal period, inclination, apogee, and perigee; and (e) general function of the space object.

None of the agreements listed above would affect US development of potential space defense systems as long as the testing of such systems did not violate any of the stated obligations. [Deleted].

C. Effect on Current and Prospective Negotiations.

1. General.

The US will continue to pursue an operational ASAT system and measures to enhance the survivability of US space systems [deleted]

[deleted].

2. Former ASAT Negotiations.

In March 1977, the US proposed to the Soviets the formation of a joint working group to discuss arms control limitations on antisatellite systems. The first round of talks was held in Helsinki on June 8-16, 1978. The discussions were exploratory in nature to determine the possibility and basis for subsequent negotiations on limiting certain activities directed against space objects and systems for conducting such activities. US and Soviet delegations were convened in Bern, Switzerland,

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from January 23 to February 16, 1979, and again April 23 to June 17, 1979, in Vienna to continue negotiations. The US proposed at that time [deleted]. The US-USSR Joint Communique issued in Vienna in June 1979 stated that the sides "agreed to continue actively searching for a mutually acceptable agreement in the continuing negotiations on ASAT systems." The Soviet invasion of Afghanistan occurred in late 1979 and since that time no further ASAT talks have been held. The Soviets have since called publicly, at both the UN and the Committee on Disarmament (CD), for a resumption of the US-Soviet arms control negotiations which have been suspended, specifically mentioning the ASAT talks at the UNGA, but they have not approached the US bilaterally regarding the ASAT talks.

3. Issues for Consideration.

The definition of what comprises an ASAT system could have a bearing on several US space programs, to the extent that constraints on ASATs might be inferred to apply to other elements of the US space program [deleted].

For example, the F-15s serving as ASAT carrier aircraft would also serve as air defense interceptors. Under an ASAT agreement, as mission-shared aircraft, the F-15s used as ASAT carriers might require verifiably distinguishable features to distinguish them from air defense F-15s.

[Deleted]. Since SPACETRACK now provides, and will continue to provide vital US capabilities to monitor space activity, including US NTM activity and foreign ASAT programs, any constraint which inhibited the continued operation and improvement of this

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system would be detrimental to US space efforts. That SPACETRACK [deleted], and thus may complicate negotiations.

The Space Transportation System, for example, is designed to place payloads into earth orbit, inspect and repair compatibly engineered satellites in orbit (below 600 NM), and retrieve compatibly engineered US or other space systems below 600 NM for return to earth. The Shuttle was not developed as an ASAT system. Neither feasibility tests nor plans have been developed to achieve an ASAT capability for the Shuttle.

[Deleted].

At its 36th session in 1981, the UN General Assembly adopted two resolutions requesting the CD to take up the matter of outer space arms control. A Western resolution requested the Committee to, "consider ... the question of negotiating" new agreements on outer space arms control, in particular an effective and verifiable agreement on prohibiting antisatellite systems. [Deleted]. A second, Soviet-backed resolution requested the Committee to "embark on negotiations..." on the text of a treaty "to prevent the spread of the arms race to outer space." The Soviets also introduced in the UNGA a draft treaty to ban weapons from space.

In UN debates on the subject the US rejected the Soviet-backed resolution, especially in consideration of their operationally deployed ASAT systems, and characterization of the US Space Transportation System as a weapon. In the CD, discussion has been limited to considering the question of negotiations on outer space arms control.

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D. Effect on Global and Regional Stability.

It is believed that the likelihood [deleted]. However, the likelihood [deleted]

[deleted].

A Soviet advantage in ASAT capability could contribute to strategic and regional instability. [Deleted].

ASAT weapons could pose a considerable threat to critical satellites on both sides, creating a situation in which neither side could rely with confidence on unprotected space systems to provide reconnaissance of foreign forces, navigational data, or other necessary forms of support. The effects of ASAT deployments by both sides on strategic stability could be lessened by two additional factors. [Deleted]

[deleted].

E. Technological Implications.

A US space defense program may have a technological impact on Soviet satellite and antisatellite programs, but it appears unlikely that other countries with space programs would devote resources to antisatellite ~~development~~ in the near future, or would have the incentive to do so even if they possessed the necessary technology.

[Deleted]

[deleted] the importance of verifiability in any proposed ASAT agreement is underscored.

To offset future US antisatellite systems, the Soviets might elect to increase [deleted].

Soviet antisatellite programs are driven by their national security requirements. However, depending on their perceptions of US ASAT [deleted] developments, they might see it in their interests to seek some type of ASAT limitations. If they decide to improve their ASAT capability, options open to them include:

[deleted];

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[deleted].

The Soviets might also combine [deleted].

F. Potential Interaction with Other Programs.

The potential for use of [deleted]

[deleted].

DARPA has defined [deleted].*

Advanced space technology [deleted] could also provide the necessary technology for [deleted] system.** Because of this interrelationship,
an agreement which [deleted].

G. Verification.

[Deleted].

A principal method of verifying [deleted]

[deleted].

Verification might be enhanced by cooperative measures in some areas in which US monitoring capabilities are limited. The Reagan Administration has made it clear that the US will insist on verification procedures to ensure full compliance with the provisions of any agreement, including the possibility of measures beyond national technical means, if necessary, to achieve US objectives.

[Deleted].

The Soviets also may have concerns over the verification

[deleted]

---

* [Deleted].

** The development, testing and deployment of sea-based, air-based, space-based and mobile land-based ABM systems and their components are prohibited by the ABM Treaty. It bans all deployment of ABM systems and components (missiles, launchers, and radars) beyond those allowed by Article III. Should ABM systems based on other physical principles and including components capable of substituting for ABM missiles, launchers, or radars be created in the future, limitations on such systems and their components would be subject to discussion in accordance with the ABM Treaty provisions for consultation and agreement, and/or amendment.

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[deleted].

Likewise, there are significant definitional and monitoring problems associated with [deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The Soviets currently possess an operational ASAT and the US does not. The arms control policy with regard to space defense is consistent with a US space defense program which:

- -- will provide a capability to negate Soviet military satellites that directly support Soviet combat forces;
- -- will provide a capability that would deter the Soviets from using their ASAT against US space systems;
- -- indicates US determination not to permit a Soviet antisatellite system monopoly;
- -- will provide a hedge against Soviet cheating or covert deployment of an effective antisatellite system in the event an ASAT agreement is reached;
- -- is consistent with US obligations under the Outer Space Treaty, the UN Charter, the ABM Treaty, the International Telecommunications Convention, the Convention on Registration of Objects Launched into Outer Space, and the Direct Communications Link Modernization Agreement;
- -- would not adversely affect other arms control negotiations;
- -- [deleted];
- -- is not likely to lead to third-country development of antisatellite systems; and
- -- [deleted].

Many potential provisions of [deleted].

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BALLISTIC MISSILE DEFENSE

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
63304A	Advanced Technology Program (ATP)
63308A	Systems Technology Program (STP)
DOE	SENTRY Warhead

The Department of the Army is responsible for conducting a continuing research and development (R&D) program in ballistic missile defense (BMD)* within the constraints of the Anti-Ballistic Missile (ABM)* Treaty. The current US BMD R&D program is structured into two complementary and closely interrelated efforts, the Advanced Technology Program (ATP) and the Systems Technology Program (STP). These efforts are aimed at building the technological base, at both the component and systems level, to provide a wide range of options for possible strategic defense applications including the definition and demonstration of the defended options for MX** basing included in President Reagan's Strategic Modernization Program.

* ABM and BMD are used interchangeably. Generally, ABM is used when referring to the Treaty and BMD is used in the context of the existing US R&D program.

** The MX is now named Peacekeeper.

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II. PROGRAM DESCRIPTIONS

Since the ABM Treaty was signed in 1972, the scope and direction of the BMD program have changed markedly. The SAFEGUARD System, undergoing deployment at that time, has been inactivated with the exception of the Perimeter Acquisition Radar (PAR) near Grand Forks, North Dakota.* The PAR is now operated by the Air Force and used for submarine launched ballistic missile early warning and intercontinental ballistic missile (ICBM) attack assessment. A follow-on BMD systam prototype demonstration program was terminated in 1975. A preprototype demonstration program for the terminal defense of ICBMs was initiated in 1980. This program has since been redirected toward maintaining a low-level, near-term deployment option in line with recent Strategic Modernization Program decisions. The current BMD program increases emphasis on broadly basad research and development in such areas as advanced endoatmospneric and exoatmospheric defenses, nonnuclear kill, and long-wavelength infrared optics. It is aimed at reducing both the cost and the system development lead time, as well as improving the effectiveness of systems applicable to ICBM defense. Thus the program allows the US to keep abreast of advances in BMD technology while providing a hedge against possible Soviet ABM breakout. It also provides options for enhancing ICBM survivability and for defending other strategic targets.

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* The system's components remain Treaty accountable unless dismantled in accordance with the agreed procedures for dismantling and destruction worked out in the Standing Consultative Commission.

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A. Advanced Technology Program.

The Advanced Technology Program (ATP) is a broadly based research effort whose objectives are to provide the advanced technological foundation for future BMD concepts, emphasizing approaches which could yield fundamental breakthroughs in BMD capabilities; and to provide the technological base for substantial improvements in nearer-term BMD systems. Significant research projects underway in FY 1984 are described below. (For a discussion of potential BMD applications of directed energy technologies, see the arms control impact statement on Directed Energy.)

One part of the ATP investigates advanced radar and optical sensors. Millimeter wavelength radars promise improved resolution and greater accuracy in measuring target range, angle and velocity. In FY 1984, efforts to gather and analyze field test data will continue.

Homing interceptors employing nonnuclear kill warheads are being developed to provide an alternative to nuclear warhead interceptors for endoatmospheric ballistic missile defense. This capability requires [deleted] an endoatmospheric nonnuclear kill capability.

Efforts are also underway to define the potential of passive optics to detect and discriminate large numbers of objects

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in space. An optical data gathering device called the Designating Optical Tracker (DOT) that operates in the long-wave infrared (LWIR) part of the spectrum has been flight tested at Kwajalein. The DOT is launched by command from a sounding rocket and operates above the atmosphere. Five tests have taken place (in December 1978, February 1980, September 1980, June 1981, and August 1982). Although no more tests are planned, data from the five tests are still being evaluated.

The Advanced Technology Program also is concerned with developing advanced data-processing capabilities.

[Deleted] will continue for the Optical Aircraft Measurements Program (OAMP). The system is expected to be fully operational [deleted]. The OAMP will use an airborne [deleted] applicable for operation in a number of BMD system alternatives.

B. Systems Technology Program.

The Systems Technology Program (STP) is concerned with integrating promising new technologies such as nonnuclear kill, testing new techniques, and solving technical issues critical to the successful operation of potential BMD systems. The STP exploits advances and breakthroughs achieved by the ATP and, concurrently, addresses those aspects of BMD research that require integrated testing of components and subsystems in as realistic an environment as possible.

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The current thrust of the BMD STP effort is focused on the advancement of endoatmospheric and exoatmospheric defense concepts leading to evolutionary system capabilities. Both concepts, either individually or combined in a layered defense, offer options for defending a wide range of strategic assets, for maintaining US ICBM survivability and for countering continued Soviet threat growth. Previously emphasized systems concepts, such as the SENTRY (see below) and the possible refurbishment of the SPARTAN and SPRINT interceptors currently in storage, will be retained as near-term possible deployment options with the Peacekeeper.

1. Terminal Defense (SENTRY).

The SENTRY program is a follow-on to the earlier Low Altitude Defense (LoAD) effort, which was an accelerated technology development program for terminal defense of hardened strategic targets. Originally, schedules called for Phase I of the LoAD preprototype demonstration program to validate the radar, data processor, and interceptor technologies by [deleted]. The basic LoAD was being designed as a generic system capable of being adapted to several specific defense applications. Since the defense of Peacekeeper/MPS (multiple protective shelters) presented the most challenging set of design requirements for LoAD, much of the preliminary effort was directed toward it. Further, the basic LoAD system design was to employ small radars, distributed data processors and high acceleration nuclear-armed interceptors and

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had the inherent capability to defend a range of hardened ICBM basing site configurations.

The cancellation of MPS led to a reorientation of the SENTRY program toward emphasis on defense of the Peacekeeper in Minuteman silos and, more recently, the closely spaced basing (CSB) option. Since the November 22, 1982, announcement on Peacekeeper basing did not include a requirement for a near-term BMD deployment, the SENTRY program has been reoriented. Component development efforts will continue, but at a slower pace. For SENTRY, current DOD activities remain focused on [deleted].

2. Overlay Defense.

The STP has in recent years been investigating the potential of a multitiered, or layered, approach to ICBM defense. The high-altitude component, or overlay, in this conceptual system would feature long-range interceptors with nonnuclear warheads and optical, terminal-homing guidance systems to make high endo-atmospheric or exoatmospheric intercepts. Candidates for the low-altitude component include SENTRY or other advanced terminal defense systems.

In a conceptual tactical configuration for an overlay system, a rocket probe would be launched or an airborne optical sensor would be activated upon receipt of attack warning from forward acquisition systems such as ground-based early warning

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[deleted]. Each Overlay interceptor missile would be equipped [deleted] reacquire the specific reentry vehicles for intercept and nonnuclear kill (NNK). Current studies for the overlay system are being directed toward both the near-term threat and the more sophisticated far-term threat [deleted].

The Homing Overlay Experiment (HOE) is designed to resolve key development issues associated with exoatmospheric NNK and optical guidance and to demonstrate the intercept capability of a single kill vehicle using an LWIR terminal guidance system. The four currently planned tests of the experimental HOE flight vehicle will be completed in FY 1983.

III. STATED MILITARY REQUIREMENTS

Dramatic improvements in the offensive capability of the Soviet ICBM force have seriously undermined the ability of our ICBM force to survive a Soviet attack and deliver an effective retaliatory response. In conjunction with the deployment of the Peacekeeper in a more survivable basing mode, BMD may prove to be valuable in maintaining Peacekeeper survivability in the face of future enhancements of Soviet strategic capability. Without the assurance that they could essentially prevent Peacekeeper

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retaliation, the Soviets could have little confidence in their ability to meet their objectives by means of nuclear aggression.

President Reagan has identified that BMD could potentially contribute to the survivability of Peacekeeper basing and has called for BMD to be considered as an option in his strategic modernization program.

The scope of work outlined in the two complementary efforts within the overall US BMD R&D program has been structured, within the terms of the ABM Treaty, to meet stated requirements and objectives, i.e.: (1) to develop advanced BMD concepts, technology, and components to ensure a technological capability to counter future ballistic missile threats; and (2) to continue to validate, in a systems context, BMD components which could be deployed for a variety of missions, including defense of the Peacekeeper. Other objectives of the program include providing assistance in the evaluation of US strategic offensive force penetration capability and Soviet BMD activity.

The current US BMD R&D effort is largely motivated by the threat posed by growing Soviet ICBM counter-silo capabilities and by the USSR's own continuing BMD development activities. The Soviets continue to deploy an improved ICBM force and are proceeding with the development of both new and modernized ICBMs. The accuracies of these ICBMs [deleted], their multiple independently targetable reentry vehicle (MIRV) capabilities, and their large yield warheads, combine to threaten the survivability of our ICBM silos.

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[Deleted].

IV. FUNDING ("then year" $ in millions)

	FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion
Advanced Technology (63304A)					
Development $	1504.3	143.2	[deleted	]	Continuing
Production $	N/A	N/A	[deleted	]	N/A
Systems Technology (63308A)					
Development $	1436.7	377.3	[deleted	]	Continuing
Production $	N/A	N/A	[deleted	]	N/A
SENTRY Warhead (DOE)					
[		[deleted]			]
[		[deleted]			]

Funding for BMD for FY 1983 and following years reflects the increased emphasis being placed on broadly based R&D and the [deleted].

* Not available.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

A US BMD R&D program conducted within the terms of the ABM Treaty supports US arms control policy by keeping the US abreast of BMD technologies, thereby hedging against, and at the same time serving to discourage, any possible Soviet breakout from the ABM Treaty. It also provides a base of expertise for evaluating the costs and benefits of future system deployment options created by new or improved BMD technology should the US conclude that deployment would be in its interest.

B. Relation to Arms Control Agreements.

The ABM Treaty is an agreement of unlimited duration which restricts ABM deployments and limits certain areas of ABM development.* The objectives of the Treaty are to curb strategic defensive arms competition and to reduce thereby the incentive to increase the number or capabilities of offensive systems. The Treaty, which put a ceiling on ABM deployments, facilitated conclusion of the Interim Agreement limiting the number of fixed ICBM launchers and submarine-launched ballistic missile (SLBM) launchers on each side. The United States continues to be a party to the ABM Treaty.

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* Like other arms control treaties signed by the US, the ABM Treaty makes provision for withdrawal (in this case, upon six months notice) should either party decide that extraordinary events related to the subject matter of the Treaty have jeopardized its supreme interests.

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The ABM Treaty (as amended by the Protocol to the Treaty which was signed on July 3, 1974, and entered into force on May 24, 1976) permits each Party to have one limited ABM system with no more than 100 ABM launchers and no more than 100 ABM interceptor missiles at launch sites. This limited system may be deployed either within an area having a radius of 150 km and centered on the Party's national capital; or within an area at least 1300 km from the national capital, having a radius of 150 km and containing ICBM silo launchers. The US elected to deploy an ABM system centered on the ICBM field at Grand Forks. This system is no longer operational. The Soviets elected to deploy an ABM system centered on their national capital at Moscow. This system continues to be operational. [Deleted]. A Party may exchange its ABM system deployment area on the basis of the Protocol to the ABM Treaty of July 3, 1974, and in accordance with the procedures agreed upon in the Supplementary Protocol of October 28, 1976.*

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* The full title of this instrument, which was negotiated in the Standing Consultative Commission (SCC), is "Supplementary Protocol to the Protocol on Procedures Governing Replacement, Dismantling or Destruction, and Notification Thereof, For ABM Systems and Their Components."

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The ABM Treaty allows the development* and testing of fixed, land-based ABM systems and components at agreed test ranges (Article IV), but prohibits (Article V) the development, testing, or deployment of sea-based, air-based, space-based, or mobile land-based ABM systems or components, and the development, testing, or deployment of ABM interceptor missiles with more than one independently guided warheed, launchers for launching more than one ABM interceptor missile at a time from each launcher, or automatic, semi-automatic, or similar systems for rapid reload of ABM launchers.

The Treaty allows development and testing of fixed, land-based ABM systems or components based on other physical principles (such as lasers or particle beams) and including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars; however, such systems or components may not be deployed under the terms of

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* The meaning of the term "development," as used in the ABM Treaty, is as follows:

> "The obligation not to develop such systems, devices or warheads would be applicable only to that stage of development which follows laboratory development and testing. The prohibitions on development contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or breadboard model." (As provided by Ambassador Gerard Smith to the Senate Armed Services Committee during its hearings concerning ratification of the ABM Treaty. For a more complete discussion, see Senate Armed Services Committee, Hearings on the Military Implications of the Treaty on the Limitation of Anti-Ballistic Missiles and the Interim Agreement on Limitation of Strategic Offensive Arms, 92nd Congress, 2nd Session, July 18, 1972, p. 377.)

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Article III and an agreed statement in connection with Article III, unless specific limitations on such systems and their components are discussed and agreement is reached to amend the Treaty.

The FY 1984 US BMD research and development program is consistent with the ABM Treaty. The program elements described in section II, above, will continue to be monitored to ensure their compliance with the terms of the Treaty.*

The existence of a BMD research and development program within the terms of the ABM Treaty, as a base from which a BMD system could be developed and deployed, contributes to the continued viability of the Treaty and to a favorable strategic negotiations environment by providing a hedge against Soviet abrogation of the ABM Treaty.

C. Effect on Current and Prospective Negotiations.

The ABM Treaty calls for regular reviews conducted at five-year intervals. The first such review was conducted in 1977 and at that time both the US and the USSR reaffirmed their respective support for the Treaty. The most recent review was conducted from November 9 to December 15, 1982. After carefully examining the provisions of the Treaty [deleted], neither side proposed amendments to the Treaty at this time.

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* For a discussion of the relationship of the ABM Treaty to systems developed for applications other than ballistic missile defense, see the arms control impact statements on Space Defense and Directed Energy.

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(Any substantive questions that arise regarding the ABM Treaty, including proposed amendments, may, of course, be raised at any time in the Standing Consultative Commission established by Article XIII of the Treaty.) The next five-year review prescribed by tne ABM Treaty is scheduled for some time after October 3, 1987. The FY 1984 US BMD R&D program should have no effect on other current and prospective arms control negotiations.

D. Effect on Global and Regional Stability.

A continuing US R&D program within the terms of the ABM Treaty enables the US to keep abreast of advances in BMD technology and thereby reduces the possibility of the Soviet Union gaining a meaningful advantage in BMD technology. Absent the US BMD R&D program, the prospects for Soviet advantage in BMD technology, or perceptions of Soviet advantage, could be increased with attendant negative implications for global and regional stability.

The FY 1984 BMD program has no perceptible effects on such issues as the nuclear threshold, crisis stability, escalation, collateral damage and aftermath effects, or the risk of accidental war, and hence is not destabilizing on any of these grounds.

E. Technological Implications.

As noted above, US BMD R&D helps reduce the risk of Soviet technological surprise in the BMD area. The BMD program also assists in the design and evaluation of US strategic offensive systems by contributing information on their penetration capability, and by furthering technological assessments of current

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and projected Soviet BMD capabilities. By making possible greater confidence in our understanding of the potential of BMD technologies, this program supports continued US adherence to the ABM Treaty, or, if necessary, helps identify those technologies and systems for which a Treaty amendment might be appropriate.

F. Potential Interaction with Other Programs.

BMD programs can interact with strategic offensive ballistic missile programs in two ways. BMD research provides the technological base from which a system to defend ICBM sites could be developed should a decision to deploy BMD be made. The ability to deploy an effective BMD system could convince a potential attacker that any offensive buildup designed to produce a disarming first-strike capability against ICBMs would be pointless. Also, BMD deployments could stimulate the development and deployment of advanced penetration aids and maneuvering re-entry vehicles for US and Soviet offensive forces, as well as increases in force levels.

The provisions of the ABM Treaty limit all strategic ABM defenses including those with the sole purpose of defending offensive missiles such as ICBMs. The US BMD R&D program, as currently constituted, will provide the technological base (as permitted by the Treaty) for an ABM system. Thus it provides a hedge against Soviet violation or abrogation of the ABM Treaty, without providing a direct impetus for the Soviets to increase their strategic offensive forces.

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G. Verification.

Expertise accumulated through our own BMD program could assist the US in its efforts to assess Soviet BMD activities. In our judgment, [deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The FY 1984 US Ballistic Missile Defense program is consistent with the ABM Treaty and supports US arms control and national security policy. It is consistent with current and prospective arms control negotiations. The program is designed to: (1) avoid technological surprise, (2) provide a BMD technology base to hedge against Soviet violation or abrogation of the ABM Treaty, (3) improve the potential for US ICBM survivability, and (4) provide deployment options as a hedge to counter Soviet threat growth. It also supports our ability to assess the capabilities of US ICBMs and SLBMs to accomplish their strategic deterrent missions.

The BMD program as it is presently constituted has no adverse arms control impact.

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SEA-LAUNCHED CRUISE MISSILE

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
64367N	TOMAHAWK
64370N	SSN 688 Class Vertical Launch System
Procurement	BGM-109 (TOMAHAWK Cruise Missile)
DOE	W80-0 SLCM Warhead

Sea-Launched Cruise Missile (SLCM)-related program elements -- previously a part of the Intermediate-Range Nuclear Forces ACIS -- are being treated separately this year. Despite the physical similarities between the sea- and ground-launched versions of the TOMAHAWK Cruise Missile, differences in the stated military requirements and the strategic implications associated with the SLCM warrant a separate ACIS this year.

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Although the direction of the TOMAHAWK missile program remains unchanged, the ongoing development of vertical launch systems (VLS), the growing number of launch platforms (submarines, battleships, guided missile cruisers, and destroyers), and the decision to proceed with the development of the W80 nuclear warhead (TLAM/N) have potential arms control implications.

While development of conventional warheads for the SLCM is underway, and their implications are discussed, primary emphasis in this ACIS is on its nuclear capabilities. SLCM enhancements will contribute to the revitalization of the US strategic force posture by providing a strategic reserve force. SLCM also has implications for bilateral and multilateral arms reduction talks.

II. PROGRAM DESCRIPTION

A. Capabilities.

The TOMAHAWK sea-launched cruise missile is being developed with a conventional and nuclear capability for land-attack (TLAM) and a conventional capability for ship-attack (TASM). While PERSHING II (PII) and the ground-launched cruise missile (GLCM) are oriented toward NATO requirements, the SLCM is being developed to satisfy US requirements worldwide. The TOMAHAWK missile is sized to fit the standard 21-inch torpedo tube and is capable of being deployed aboard a variety of surface ships and submarines in several launch configurations. The SLCM is 219 inches long and is powered by a turbofan engine. Guidance for

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the TLAM/N is by inertial navigation with terrain contour matching updates at periodic intervals. It flies at subsonic speeds at low altitude. TLAM/N's operational range would be approximately [deleted] km with relatively high terminal accuracy.

The land-attack SLCM will be deployed, along with antiship SLCMs, on 637 and 688 class Nuclear-Powered Attack Submarines (SSNs). [Deleted], with a mix of variants determined by the fleet commander based on the mission assignment. Development of the VLS has been initiated which could provide submarines of the SSN 688 class with the capability to store and launch up to an additional 12 TOMAHAWK Cruise Missiles (either land-attack or antiship) from vertical launch tubes without degrading the SSN's primary mission.

Deployed aboard submerged attack submarines, the SLCM would be largely undetectable prior to launch. Moreover, although scenario dependent, [deleted].

Command and control of submarine-launched nuclear land-attack SLCMs would be analogous to that exercised for submarine launched ballistic missiles (SLBMs).

SLCMs will also be deployed on surface ships, including cruisers, destroyers and battleships. Since missile procurement is only in the planning stage, loadings are nominal. The Navy plans to vary the TOMAHAWK mix according to specific platforms and mission requirements. Initially, SLCMs will be launched from an armored box launcher. Programs have been initiated to develop a vertical launch system for surface combatants to accommodate a variety of Navy missiles, i.e., the AEGIS/STANDARD missile, TOMAHAWK and HARPOON.

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The land-attack Sea-Launched Cruise Missile has been designed to carry the W80 nuclear warhead. The W80 warhead is planned as a common warhead for use with both the Navy SLCM (W80-0) and the Air Force Air-Launched Cruise Missile (W80-1). Enhanced safety features will include insensitive high explosive, and an improved warhead electrical system. [Deleted].

When deployed aboard surface ships, command and control of nuclear SLCMs would be similar to that exercised for naval tactical aircraft in theater roles.

B. Program Status.

The program to develop and test a sea-launched cruise missile was initiated in 1972. Procurement of conventionally armed land-attack and antiship missiles began in FY 1980. The FY 1984 program includes the completion of the Operational Test and Evaluation for the submarine nuclear land-attack TOMAHAWK and development testing, operational testing, and operational evaluation for surface ship conventional land-attack and nuclear land-attack TOMAHAWK. Additionally, the Navy should achieve initial operational capability (IOC) in FY 1984/85 for surface ship TASM and in FY 1985 for conventional land-attack missiles. The IOC for the surface-launched and submarine-launched nuclear land-attack version of the TOMAHAWK missile is June 1984. Some [deleted] TLAMs are planned for deployment through the 1980s.

The IOC for the surface ship VLS is scheduled for late FY 1986. The first installation of the 688 class VLS will be completed in December 1985. The Navy plans to deploy a small number of nuclear-armed cruise missiles on selected SSNs with VLS starting in 1986.

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Initial production of the W80-0 [deleted] by quantity production and stockpile.

III. STATED MILITARY REQUIREMENTS

The land-attack SLCM is being developed with a view toward unique US requirements worldwide. As a part of the strategic modernization program, nuclear land-attack SLCM would provide a survivable, credible, and effective military option on a worldwide basis to strike selected naval and other fixed targets ashore and to contribute to a strategic reserve in support of national policy. [Deleted]

[deleted]. Deployment of nuclear land-attack cruise missiles on highly survivable SSNs will be particularly valuable as an addition to the strategic reserve force to bolster the deterrent posture.

The TOMAHAWK conventional land-attack mission requirement is to counter the threat against US naval forces by destroying primarily naval or naval-related targets ashore, ship and submarine facilities or other high value individual targets, and to suppress ground-based air defense systems to enhance carrier aircraft penetration. The antiship TOMAHAWK mission requirement is to redress the current Soviet antiship cruise missile stand-off range advantage and to complement US sea-based aircraft strikes against combatant ships which have effective air defense systems.

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IV. FUNDING ("then year" $ in millions)

		FY 82 & Prior	FY 83	FY 84	FY 85 (est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Const.	Total Units	Unit Cost	Program Cost
TOMAHAWK Missile System												
PE 64367N	Development	145.0	75.5	40.6		6.5	281.3					
	Production	233.3	301.9	158.9	279.4	229.7		1203.2				
	Construction		0.5									
PE 64370N	SSN 688 Class Vertical Launch System											
	Development	48.1	47.1	40.8	26.1	32.4						
	Production											
W80-0	SLCM Warhead*											
	Development											
	Production	[					Deleted					]

* All R&D costs charged to the W80-1 as first user.

V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Equitable and verifiable arms control agreements, when combined with sound foreign and defense policies, can play a critical role in enhancing deterrence and ensuring a stable military balance. The President has outlined the objectives of US arms control policy as follows: Reduce significantly the number and destructive potential of nuclear weapon systems; seek agreements which will lead to equal levels of forces on both sides; seek agreements which enhance US and allied security and reduce the risk of war; and insist on verification measures to ensure compliance with the provisions of arms control agreements.

The strategic forces modernization program is necessary to correct imbalances created by unilateral US restraint and an enormous Soviet military investment and deployment of new generations of Soviet strategic systems. The result will be a deterrent that is more secure and stable than exists today. This should, in turn, create the incentives necessary for the Soviets to respond seriously to proposals for equitable and verifiable reductions in arms.

This upgrade of the Navy's current nuclear land-attack force will provide: (a) a means of bringing nuclear forces to bear in areas of the world where they are not forward deployed ashore; (b) a mobile nuclear reserve to augment land-based systems; and (c) a contribution to a post-exchange reserve force.

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The modernization of the Navy's capabilities represented by the SLCM is consistent with the US policy of restoring the strategic balance, enhancing stability through increased survivability, and creating incentives for the Soviets to enter into meaningful negotiations for arms reduction treaties. Indeed, introduction of the SLCM [deleted]. More importantly, [deleted].

B. Relation to Arms Control Agreements.

The policy of the Administration is not to undercut existing strategic arms agreements so long as the Soviet Union shows equal restraint. This policy may contribute to an atmosphere of stability while the US attempts to achieve more meaningful agreements that will reduce the number of ballistic missile warheads and enhance our national security.

1. Non-Proliferation Treaty.

Article VI of the Non-Proliferation Treaty (NPT) to which the US, USSR, and 117 other countries are parties, states:

> Each of the parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many nonnuclear weapons states, party to the Treaty, have stated that they agreed in Article II of the Treaty to foreswear developing or acquiring nuclear weapons in

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part in return for this pledge in Article VI by the nuclear-weapon state parties.

As President Reagan emphasized in his policy statement of July 16, 1981, the US is committed to preventing the spread of nuclear weapons to additional countries. The US strongly supports adherence to the NPT and seeks to reduce the motivations for additional states acquiring nuclear explosives by improving regional and global stability and addressing the legitimate security concerns of other friendly states.

In keeping with Article VI of the NPT, the US has participated in arms control negotiations relating to the limitation and reduction of nuclear weapons, such as Strategic Arms Limitation Treaty (SALT), and is now participating in Intermediate-range Nuclear Forces (INF) and Strategic Arms Reduction negotiations. As part of the 1979 two-track INF decision, NATO made a commitment to seek arms control negotiations with the Soviet Union on intermediate-range nuclear forces. The US and the USSR began INF negotiations on November 30, 1981, and on June 29, 1982, also began Strategic Arms Reduction Talks (START).

Despite these continuing efforts, many of the non-aligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus final declaration.

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The nonaligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US restraint in nuclear modernization would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

2. SALT II

The SALT II Protocol, which would have, in any case, expired on December 31, 1981, would have prohibited the deployment of cruise missiles capable of ranges in excess of 600 kilometers on ground-based and sea-based launchers during the period of the Protocol. However, the development and testing of long-range (over 600 km) cruise missiles from sea-based or ground-based launchers was permitted as long as they were not equipped with multiple independently targetable warheads. Thus, SLCM was not impeded by the Protocol, since it will not have multiple independently targetable warheads. Also, the period required for development would have precluded its deployment prior to the expiration of the Protocol, on December 31, 1981.

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3. LTBT/TTBT.

Planned development and deployment of the W80-0 SLCM warhead will be conducted in a manner consistent with the provisions of the Limited Test Ban Treaty (LTBT) which prohibits weapons tests in the atmosphere, in outer space, and under water and the as yet unratified Threshold Test Ban Treaty (TTBT), which prohibits underground nuclear weapon tests above 150 kilotons.

C. Effect on Current and Prospective Negotiations.

SLCM deployments have implications for current and future arms reduction negotiations.

1. START Negotiations.

On November 18, 1981, President Reagan announced that the US would seek to negotiate significant reductions in nuclear arms which would result in levels that are equal and verifiable. On May 9, 1982, the President announced a two-phase US approach to the Strategic Arms Reduction Talks. In the first phase of negotiations, the US seeks to reduce the number of warheads on deployed strategic ballistic missiles by about one-third, to about 5,000 on each side. No more than half the remaining ballistic missile warheads would be on land-based missiles. The US also seeks to cut the total number of deployed strategic ballistic missiles on each side to an equal level of 850, about one-half of the current US level. In the second phase of START negotiations, the US seeks further reductions in the overall destructive power of each side's arsenal to equal levels, including a mutual ceiling

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on strategic ballistic missile throw-weight below the current US level. Because of their slow flying characteristics, cruise missiles do not pose the same threat as ballistic missiles. [Deleted].

The President's proposal attempts to reduce the threat of nuclear war by enhancing deterrence and securing a stable nuclear balance. The main threat to the strategic balance has been the massive Soviet build-up of its strategic ballistic missile forces. In this regard, the proposal focuses, in the first phase, on significant reductions in strategic ballistic missile warheads and deployed strategic ballistic missiles themselves. Such reductions would halt and reverse the destabilizing trend which would have been permitted under the unratified SALT II Treaty.

2. Negotiations on Intermediate-Range Nuclear Forces.

In response to the massive build-up of Soviet intermediate-range nuclear forces, NATO Ministers agreed in December 1979 to modernize the Alliance's land-based INF while pursuing US-Soviet negotiations on arms control involving these systems. There is a consensus among our NATO allies that if deterrence is to be maintained, the Alliance must move to redress the imbalance, either through negotiation, or in the event a concrete arms control agreement is not achieved, through modernization -- specifically, the deployment of PERSHING II and GLCM.

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We are negotiating with the Soviets in Geneva on the basis of the President's November 18, 1981, proposal to cancel deployment of PII and GLCM in exchange for elimination of all Soviet SS-20s, SS-4s, and SS-5s. It is the US position that sea-based systems should not be included in an INF agreement. We are focusing on land-based, longer-range Soviet and programmed US INF missiles because they are the systems of greatest concern. This proposal, if carried out, would be a major step toward achieving stability at dramatically reduced levels of forces. On February 2, 1982, during the first round of INF negotiations, the US presented a draft treaty that embodied this proposal.

The Soviets submitted their treaty proposal on May 25, 1982, during the second round of negotiations. [Deleted]. The Soviet objective is clearly to forestall NATO deployment without sacrificing the Soviet monopoly in INF missiles of longer range.

[Deleted].

It is the position of the United States, as outlined in Secretary of Defense Weinberger's March 1982 Ministerial presentation to the NATO Nuclear Planning Group that a significant role for TLAM/N will be as an element of the US Strategic Reserve Force. [Deleted]. Without the modernization of NATO's LRINF in the manner agreed within the Alliance, the prospects for achieving results in arms control will be drastically reduced.

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3. **MBFR Negotiations.**

[Deleted].

4. **CTB Negotiations.**

A Comprehensive Test Ban (CTB) continues to be a long-term objective of US arms control policy. However, there are serious concerns about the national security implications of a CTB under current circumstances, including our ability to verify Soviet compliance with such an agreement. It should be recognized that nuclear testing plays a very important role in ensuring a credible US nuclear deterrent. The United States uses nuclear testing to develop new nuclear weapons, to confirm the reliability of stockpiled weapons, to improve the safety and security of weapons against accidental or unauthorized detonation, and to assess the vulnerability of military systems to nuclear effects. For these reasons, the President has decided not to resume the trilateral CTB negotiations initiated under the previous Administration, but suspended since November 1980. However, the US will continue to participate in discussions on ways to improve verification and compliance related to nuclear testing issues in a special working group of the Committee on Disarmament in Geneva.

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D. Effect on Global and Regional Stability.

US policy has been, and continues to be, the deterrence of attack, especially nuclear attack, on ourselves and our Allies. The modernization of US naval capabilities represented by the SLCM will provide a major contribution to the preservation of deterrence well into the next century. This should enhance global and regional stability by clearly demonstrating to any potential aggressor that he has nothing to gain and much to lose by attacking the US and our Allies.

SLCM's impact on stability is largely a function of three sets of interrelated factors: (1) the characteristics of cruise missile systems themselves; (2) the wide variety and number of ships considered as potential launch platforms; and (3) Soviet perceptions of, and response to, US long-range cruise missile deployments. Each set of factors is discussed in turn below but throughout the discussion it is important to remember that the factors are interrelated. The relative importance one assigns to one particular set, vis-a-vis the others, will affect overall judgments about SLCM's arms control implications.

1. Cruise Missile Characteristics.

The nuclear, sea-launched, land-attack, cruise missile program will, in addition to providing a strategic reserve in support of national policy, improve the credibility of the Navy's worldwide nuclear land-attack force. Specifically, SLCM

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will provide an improved capability to: (1) bring nuclear forces to bear in areas where they are not forward deployed ashore and, (2) provide a hedge against Soviet pre-emption of land-based systems. As such, their deployment can be viewed as strengthening regional and global stability. Similarly, SLCM's accuracy, [deleted] would improve the capability for flexible nuclear options and could assist in escalation control. SLCM, like other US systems, would be designed to operate according to clearly established command and control procedures [deleted].

Additional factors affecting stability and deterrence with the introduction of SLCM are its range, flight time, and survivability.

- The cruise missile's range is a significant factor from a military standpoint and could be from an arms control point of view as well. With an operational range of [deleted], SLCMs, optimally positioned, could reach many targets [deleted].

- The relatively slow flight of current generation cruise missiles does not represent a first-strike threat to the Soviet Union. Rather, cruise missile deployments symbolize a second-strike capability which should have a stabilizing effect.

- Cruise missiles with small radar cross-sections and a low-altitude and terrain-following flight path are difficult

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to engage and, as such, have a high probability of penetrating sophisticated air defense systems. This increased capability could promote deterrence and thus stability.

2. Variety and Number of Potential Launch Platforms.

Current plans call for the deployment of SLCM on a wide variety of surface ships and submarines. Potential launch platforms include: IOWA-class battleships; DD963 destroyers; AEGIS-class cruisers; and SSN 637 (STURGEON-class) and 688 (LOS ANGELES-class) submarines. From the US perspective, the large number of available launch platforms complicates the Soviet targeting problem and should increase system survivability and hence enhance deterrence.

3. Soviet Perceptions and Responses.

While the penetrativity of the cruise missile does not equal that of a ballistic missile, the cruise missile represents, as discussed above, a potent nuclear system which is highly mobile and difficult to detect. The range, accuracy and variety of existing SLCM options gives the system the capability to perform both strategic and nonstrategic missions. From the Soviet perspective the problem is compounded by the fact that TOMAHAWK cruise missiles, will be deployed on many different platforms, and thereby make it difficult for the Soviets to negate US retaliatory capabilities. Faced with this prospect, the Soviets could become more willing to engage in substantive arms control negotiations which could, *inter alia*, limit such systems.

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For example, they have long been aware of Western concerns about their continuing buildup of modernized INF. It was not until faced with the prospect of Western deployments of similar systems that the USSR displayed any willingness to negotiate limitations on its own theater nuclear systems. In any event, while it is the US position that the advent of a sea-based land-attack cruise missile should promote both global and regional stability, the system represents a new multipurpose nuclear capability which, from a Soviet perspective, can be viewed as difficult to negate.

E. Technological Implications.

The major technological impact of proposed SLCM programs is likely to be their effect on the weapons acquisition policies of other countries.

While the increased capabilities of advanced cruise missiles might make their production militarily and politically attractive to some nations, because of the high development costs and the technology required, it seems unlikely that, except in a few cases, such programs are likely to be undertaken. Currently, the United States, Soviet Union, France, Italy, United Kingdom (UK), China, Japan, Norway, Sweden, the Federal Republic of Germany (FRG), South Africa, Taiwan, and Israel produce cruise missiles. [Deleted]. The

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current non-US systems could undoubtedly be upgraded, but the limited research, development, and production bases of many nations, coupled with high development costs make advanced cruise missiles an unattractive acquisition option for all but a few. Manned aircraft continue to present more readily available and sufficiently flexible delivery systems to meet the present needs of most states.

Similarly, most smaller countries would not seek a conventionally armed cruise missile whose payload and high accuracy would be militarily significant only when combined with sufficient tactical air power. Large numbers of cruise missiles would be required for the same task as limited numbers of aircraft. Manned aircraft, which also possess some stand-off capability, could deliver greater payloads and more varied munitions.

[Deleted].

Other countries may intend cruise missiles for less demanding missions than the US. In such cases, development of relatively unsophisticated long-range cruise missiles could be seen as being practical. Development of cruise missiles similar to ours, however, could present formidable technical obstacles to other states. In any case, the impact of the US decision to deploy cruise missiles on the incentives of our Allies to assume a similar course is uncertain.

[Deleted].

[Deleted].

F. Potential Interaction with Other Programs.

As discussed previously, SLCM is important to deterrence because it constitutes a worldwide nuclear capability and

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a survivable strategic reserve. The SLCM, while conveying to the Soviet Union that its territory is not a sanctuary, also threatens important reserves, supplies, and other support for Warsaw Pact forces, and thus complements other nonstrategic nuclear systems. [Deleted]. The range of options resulting from conventional, nonstrategic and strategic nuclear forces provides some possibility of controlling escalation and stopping conflict at the lowest level possible should deterrence fail. However, there is no guarantee that Soviet military responses would support our attempts to limit collateral damage and the destructiveness of war. Additionally, the flexibility of these nuclear forces strengthens stability.

Moreover, SLCM's increased survivability might allow the West to put relatively less dependence on aircraft for the delivery of nuclear weapons, thereby releasing some aircraft for conventional roles.

G. Verification.

Arms control agreements with a highly secretive adversary like the Soviet Union cannot be based on trust. There must be effective means of verification that enable the US to know with confidence whether the terms of agreements are being honored. In practice, this means the US must be able to monitor activities in the areas covered by these treaties in order to detect any

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violations at a very early stage. For instance, if the Soviets accept US INF proposals to dismantle longer-range INF missiles there will be a continuing vital requirement to monitor Soviet activities to ensure that they do not undertake covert actions to circumvent a treaty.

In the past, the US relied primarily on national technical means (NTM) of verification. As arms control agreements, the systems they cover, and the possibilities of concealment become more complex, it may be necessary to supplement NTM with cooperative measures requiring both parties to provide direct evidence of verification. The Reagan Administration has made it clear that the US will insist on verification procedures to ensure full compliance with the provisions of any agreement, including the possibility of measures beyond national technical means, if necessary, to achieve US verification objectives.

[Deleted].

Some characteristics of cruise missiles which could complicate verification include: range, payload, and missile types and missions.

- [Deleted].
- [Deleted].
- [Deleted].

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VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The Sea-Launched Cruise Missile program is consistent with US arms control policy and related Presidential decisions and is not constrained by existing arms control agreements.

The effect of US modernization programs on current and prospective arms control negotiations has already been demonstrated in the INF talks. It was not until faced with the prospect of PII and GLCM deployments that the USSR displayed a willingness to engage in substantive arms control negotiations. With respect to potential future arms control agreements, mobile systems such as cruise missiles are likely to present difficulties for verification.

The impact of SLCM on global and regional stability is largely a function of [deleted].

[Deleted].

In summary, the SLCM program is important to deterrence and stability. Like any nuclear modernization program, however, it entails political costs and carries with it important arms control implications. In this regard, we will continue to ensure that this program is consistent with our overall national security objectives, including the development of future options for reducing nuclear arms and ensuring deterrence and global stability.

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INTERMEDIATE-RANGE NUCLEAR FORCES

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
64311A	PERSHING II (PII)
64362F	Ground-Launched Cruise Missile (GLCM)
DOE Program	W85 PERSHING Warhead
DOE Program	W84 GLCM Warhead
Army Procurement	PERSHING
Air Force Procurement	GLCM Missile

On December 12, 1979, Foreign and Defense Ministers from each of the participating members of NATO agreed on a program for the modernization of NATO longer-range Intermediate-Range Nuclear Forces (LRINF), together with an arms control initiative to limit such missiles. The systems involved in this analysis are the PERSHING II (PII) and the Ground-Launched Cruise Missile (GLCM). In view of the close relationship these systems will

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share in the further development of the NATO LRINF Modernization Program, they are discussed together in this ACIS.

There have been no significant programmatic changes in either the PII or GLCM programs since the submission of the FY 1983 ACIS. A discussion of these programs is included this year because of the high level of interest in LRINF here and in Europe and the implications of LRINF modernization for US negotiating policy.* Within this analysis, primary emphasis is placed on the contribution of PII and GLCM to NATO deterrence and defense.

II. PROGRAM DESCRIPTIONS

A. PERSHING II.

1. Capabilities.

The PII, a land-mobile ballistic missile system, is a major improvement over the currently fielded P1a system. As currently envisioned, the PII will be armed only with nuclear warheads.

PERSHING 1a is currently deployed in Europe with both US Army units and units of the Air Force of the Federal Republic of Germany (FRG). [Deleted].

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* The term "longer-range Intermediate-Range Nuclear Forces" (LRINF) was introduced by the US as preparations were underway to begin negotiations with the Soviet Union in November 1981. Land-based nuclear systems (missiles and aircraft) below intercontinental range but above the range of systems designed for use on, or in direct support of, the battlefield are in the INF category.

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The PII system will employ a new missile and reentry vehicle (RV) as well as a modified version of the present erector/launcher and other ground support equipment. This upgraded ground support equipment would result in improved command and control and reduced response times and manpower requirements. The PII missile differs from its predecessor primarily by providing increased range and accuracy, [deleted].

The PII has a maximum range of 1,800 km (approximately 970 n.m.), compared to the P1a's maximum range of approximately [deleted]. The range improvement, coupled with deployment in the FRG, would permit PII to cover targets in the European USSR.

The P1a RV utilizes the W50 warhead [deleted]. PII is being designed to carry the W85 air burst/surface burst (AB/SB) warhead. The W85 will [deleted]. Higher accuracy allows the use of lower yields for a given mission with the PII, thereby reducing potential collateral damage.

PII's greater range, and increased accuracy, [deleted] should help maintain current damage expectancies in the face of ongoing Warsaw Pact/Soviet Union efforts to harden critical fixed theater targets. In particular, the Warsaw Pact has stressed emplacing earth covered concrete shelters ("hangarettes") and concrete revetments to protect aircraft on airbases. Additionally, some command, control, and communications and nuclear storage sites in Eastern Europe have been hardened.

PII's prelaunch survivability, like that of the present P1a, stems from its mobility. While deployed at peacetime quick reaction alert sites and kasernes, [deleted].

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PII's in-flight survivability, like that of P1a, stems from the high speed of the reentry vehicle. Development and deployment of an antitactical ballistic missile (ATBM) system would be required to reduce PII's effectiveness once launched. It should be noted that the [deleted].

2. Program Status.

The PII program is in the engineering development (ED) phase. An amended Program Decision Memorandum (August 1979) directed that the PERSHING II program proceed on an accelerated basis which

would result in an August 1983 Initial Operational Capability (IOC). As a result [deleted], the PII IOC in Europe has been adjusted from August to December 1983. The projected deployment completion date is [deleted]. Conversion of existing US P1a launchers is planned on a one-for-one basis. Existing US P1a missiles and warheads will be retired as PIIs are deployed.

The PII ED program is over half complete. Long-lead DOD procurement for the production phase began in FY 1982. Prototype hardware is beginning to be delivered. Technical problems that have arisen are being resolved. During FY 1983, the engineering development phase will culminate with the completion of the development and operational missile flights and the second production buy will occur. [Deleted].

B. Ground-Launched Cruise Missile (GLCM).

1. Capabilities.

The Ground-Launched Cruise Missile will be a variant of the TOMAHAWK cruise missile adapted for launch from air-transportable, ground-mobile platforms. [Deleted]. Its deployment will release some nuclear-capable aircraft for conventional tasks and increase the survivability of NATO's nuclear forces.

The GLCM is 219 inches long and is powered by a turbofan engine. Guidance is by inertial navigation with terrain contour

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matching (TERCOM) updates at periodic intervals. It flies at subsonic speeds at low altitude. Its odometer range would be [deleted] to fuel exhaustion with relatively high terminal accuracy. The design of the launch control van, transporter-erector-launcher (TEL), and associated electronics constitute the bulk of the program. System integration and testing make up the balance of the effort. The missiles, four to a TEL, will be transported and controlled from a launch control center (LCC). Four TELs, with sixteen missiles, and two LCCs constitute a GLCM flight.

The warhead planned for use with the GLCM is the W84. It [deleted] incorporates insensitive high explosives, other improved safety features, and the latest command and control technology.

GLCM deployment in the European theater will begin in 1983. Its expected accuracy, ability to penetrate air defenses, prelaunch survivability, and [deleted] will permit GLCM to destroy hard targets as well as attack soft targets effectively with relatively limited collateral damage. Consequently, the GLCM offers the prospect of helping to maintain current damage expectancies in the face of Warsaw Pact initiatives to make their fixed theater targets, such as hardened aircraft shelters, less vulnerable. GLCM's relatively long time-of-flight, however, would reduce its utility against long-range time-urgent targets.

The prelaunch survivability for the GLCM, like the PERSHING II, derives from the system's mobility. While deployed at permanent sites, the GLCM would be [deleted]. The GLCM should be [deleted]. GLCM's relationship to command and control systems would be analogous to those which exist for PERSHING missiles and tactical aircraft.

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2. Program Status.

The GLCM is currently in full-scale engineering development. Full system testing began in February 1982 using preproduction prototype missiles, TELs, and LCCs. Development of the Integrated Logistics Support System continues along with development of the training program. AFSARC III is scheduled for [deleted]. The IOC for GLCM is planned for December 1983. Current plans are to procure 560 GLCMs -- 464 nuclear-armed GLCMs for unit equipment, and 96 GLCMs for tests, training, and replacements.

[Deleted].

III. STATED MILITARY REQUIREMENTS

The Warsaw Pact has over the years developed a large and growing capability in nuclear and conventional systems that directly threaten Western Europe and have a strategic significance for the Alliance in Europe. This situation has been especially aggravated over the last few years by Soviet decisions to implement programs modernizing and expanding substantially their LRINF. In particular, since 1977 they have deployed the SS-20 missile, which offers significant improvements over previous systems in providing greater accuracy, mobility, and range, as well as having multiple warheads. During this period, while the Soviet Union has been reinforcing its superiority in LRINF both quantitatively and qualitatively, Western LRINF capabilities have remained static. At the same time, the Soviets have also undertaken a modernization and expansion of their short-range nuclear forces (SNF) and greatly improved the overall quality of their conventional forces.

Improvements to NATO LRINF are needed to provide more survivable, credible, and effective military options linking US strategic nuclear forces to the defense of Europe. LRINF deployments by NATO are planned to be of sufficient size and character to strengthen coupling, thereby enhancing deterrence of

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a Warsaw Pact attack on Western Europe. Should deterrence fail, the US and its NATO Allies would possess effective new capabilities to engage military targets.

Deployments of PII and GLCM promise to enhance current capabilities in five broad respects. First, they could provide NATO a modernized capability to strike targets on Soviet territory from Western Europe and thus strengthen the NATO deterrent against attack of Western Europe from Soviet territory. Second, [deleted]. Third, [deleted] insofar as NATO's nuclear employment is concerned. Fourth, augmenting dual-capable aircraft with PII and GLCM potentially offers greater prelaunch INF system survivability under conditions of either conventional or nuclear attack. Fifth, by having available more capable nuclear missile systems of longer range on alert to cover preplanned fixed targets, some quick reaction alert aircraft could be available for other nuclear or conventional roles.

Central to the deterrence of conflict, and to defense should deterrence fail, is the preservation of a range of options in the event of aggression. The availability of a graduated escalatory ladder enhances deterrence by raising the possibility that aggression at any one level of conflict might either be matched in kind or escalated. Deployments of PII and GLCM add a new dimension to the variety of response options below the strategic level. This helps to insure the linkage between lower response options and strategic nuclear forces and in so doing makes the threat of an effective NATO response more credible, thus enhancing deterrence.

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IV. FUNDING ("then year" $ in millions)

		FY 82 & Prior	FY 83	FY 84	FY 85 (est.)	FY 86 to Completion	Total Dev.	Total Prod.	Total Const.	Total Units	Unit Cost	Total Program Cost
PERSHING II Missile System												
PE 64311A	Development	[										
	Production											]
PERSHING II Warhead												
W85	DOE Development											
	Production											
PERSHING Ia Missile System												
	Production											
Ground-Launched Cruise Missile System						[Deleted]						
PE 64362F	Development											
	Production											
	Construction											
GLCM Warhead												
W84	DOE Development											
	DOE Production											
TOMAHAWK Missile System												
PE 64367N	Development											
	Production	[										]

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Four principles underlie the US approach to arms control. The Administration seeks agreements that: involve substantial and militarily significant reductions; result in lower levels of nuclear forces, based on equal, balanced levels of forces on both sides; include effective means of verification; and enhance US and Allied security and reduce the risk of war. The missile and related warhead programs covered by this ACIS are consistent with this approach.

The NATO decision to modernize its LRINF missile force was taken in response to the massive build-up of Soviet LRINF forces. In particular, the build-up of SS-20 missiles during a period of strategic parity has exacerbated the threat to our Allies. This system represents a significant qualitative improvement over older Soviet systems, and was deployed during a period of declining NATO LRINF capability. For example, since 1977 the Soviets have deployed 333 SS-20 launchers [deleted] and their deployment is continuing. These deployments are in addition to [deleted] SS-4 and SS-5 missile launchers still fielded, all of which are deployed against Europe. Further, the SS-20 design is tremendously advanced over the fielded SS-4s and SS-5s: [deleted] it is

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significantly more accurate than both the SS-4 and SS-5; and instead of a single one megaton warhead, it has three MIRVed warheads, [deleted]. The SS-20 is also mobile and, therefore, more survivable than its predecessors.

The NATO LRINF modernization program as reflected in the Integrated Decision Document [deleted], but seeks to ensure that NATO forces present a credible deterrent which preserves undiminished the security of the Alliance. The Integrated Decision Document which sets forth NATO's 1979 decision states that:

[Deleted].

As an integral part of their LRINF modernization decision, the Ministers further agreed, based on Alliance consideration, on a withdrawal of 1,000 US nuclear warheads from Europe as a step in the rationalization of the Alliance's nuclear force posture. The withdrawal was completed in 1980.

The US and its allies remain committed to both tracks of NATO's 1979 decision on INF modernization and arms control, namely force modernization and negotiation. In this regard, while US LRINF modernization programs (PII and GLCM) continue apace, to provide the Soviets the incentive to negotiate seriously the

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President has proposed an agreement that would trade the elimination of Soviet SS-20, SS-4, and SS-5 systems in return for cancellation of PII and GLCM deployments. Additionally, the President stated that the US is prepared to seek subsequent limits with significant reductions for other nuclear weapons systems and will negotiate in good faith to achieve global, equal and verifiable levels of weapons. It is significant to note that the Soviets repeatedly rejected US initiatives to begin INF negotiations. They only agreed to begin negotiations when it became apparent that their efforts to upset the Alliance's INF deployments were not succeeding. After close and continuous preparatory consultations with its Allies, the US began INF negotiations with the Soviets on November 30, 1981, in Geneva, Switzerland. Consultations will continue as the negotiations unfold.

B. Relation to Arms Control Agreements.

Since PII and GLCM testing is routinely accomplished in compliance with the 1963 Limited Test Ban Treaty, neither program is constrained by any arms control agreement to which the United States is a party.

1. Non-Proliferation Treaty.

Article VI of the Non-Proliferation Treaty (NPT) to which the US, USSR and 117 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

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Representatives of many nonnuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to foreswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon state parties.

In keeping with Article VI, the US has participated in arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT and is now participating in INF and START negotiations.

Despite continuing efforts at arms control negotiations, many of the nonaligned nations at the 1980 NPT Review Conference argued that there had been an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a final consensus declaration. The nonaligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

[Deleted] that many important nonnuclear-weapon countries are US allies that rely on the US nuclear arms umbrella and look upon US nuclear modernization as essential. Insofar as these countries are concerned, US nuclear modernization could inhibit proliferation.

In any case, unilateral US restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially as some of this criticism is a

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product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

2. SALT II/START.

SALT II and ongoing START negotiations were/are limited to strategic systems. Nevertheless, the SALT II Protocol, which was to have expired on December 31, 1981, would have prohibited the deployment of cruise missiles capable of ranges in excess of 600 kilometers on ground-based and sea-based launchers during the period of the Protocol. However, the development and testing of long-range (over 600 km) cruise missiles from sea-based or ground-based launchers was permitted as long as they were not equipped with multiple independently targetable warheads. Thus, GLCM testing was not impeded by the Protocol, since it will not have multiple independently targetable warheads. Also, the period required for development would have precluded its deployment prior to the expiration of the Protocol. [Deleted] [deleted].

3. LTBT/TTBT.

Planned development and deployment of warheads for longer-range INF missiles would not be affected by either the ratified Limited Test Ban Treaty (LTBT) which prohibits weapons tests in the atmosphere, in outer space, and under water or the unratified Threshold Test Ban Treaty (TTBT) which prohibits underground nuclear weapons tests above 150 kilotons.

C. Effect on Current and Prospective Negotiations.

1. MBFR Negotiations.

[Deleted]

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[deleted].

2. CTB Negotiations.

A Comprehensive Test Ban (CTB) continues to be a long-term objective of US arms control policy. However, there are serious concerns about the national security implications of a CTB under current circumstances, including our ability to verify Soviet compliance with such an agreement. It should be recognized that nuclear testing plays a very important role in ensuring a credible US nuclear deterrent. The United States uses nuclear testing to develop new nuclear weapons, to confirm the reliability of stockpiled weapons, to improve the safety and security of weapons against accidental or unauthorized detonation, and to assess the vulnerability of military systems to nuclear effects. For these reasons, the President has decided not to resume the trilateral CTB negotiations, initiated under the previous Aministration but suspended since November 1980. However, the US will continue to participate in discussions on ways to improve verification and compliance related to nuclear testing issues in a special working group of the Committee on Disarmament in Geneva.

3. Negotiations on Intermediate-Range Nuclear Forces.

In response to the massive buildup of Soviet intermediate-range nuclear forces, NATO Ministers agreed in December 1979 to modernize the Alliance's LRINF while offering US-Soviet negotiations

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on arms control involving LRINF. The 1979 decision reflected a consensus among the NATO Allies that if deterrence is to be maintained the Alliance must move to redress the imbalance, either through negotiation, or in the absence of concrete INF arms control results, through modernization. Accordingly, NATO will deploy 108 PERSHING IIs and 464 GLCMs in Europe in the absence of arms control concrete results. The "dual-track" decision has been consistently reaffirmed by the Alliance, most recently in December 1982.

We are negotiating with the Soviets in Geneva on the basis of the President's November 18, 1981, proposal to cancel deployment of PII and GLCM in exchange for elimination of all Soviet SS-20s, SS-4s, and SS-5s. We are focusing on longer-range Soviet and programmed US LRINF land-based missiles because they are the systems of greatest concern to both sides. This proposal, if carried out, would be a major step toward achieving stability at dramatically reduced levels of forces. On February 2, 1982, during the first round of LRINF negotiations in Geneva, the US tabled a draft treaty that embodied the zero-zero option.

[Deleted]. The Soviet proposal does not provide a basis for an equitable and verifiable arms control agreement. The Soviet proposal would allow the Soviets to maintain a large modern SS-20 missile force, but would require cancellation of NATO's modernization program and virtual elimination

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of US dual-capable aircraft from Europe. The Soviet proposal is based on claims that a balance exists in "medium-range" nuclear forces in Europe, a balance which includes UK and French systems, US aircraft not physically in Europe, and which excludes comparable Soviet aircraft. It therefore calls for reductions from an unequal starting point which gives the USSR an overwhelming advantage. In sum, the Soviets' so-called reductions proposal would:

- fail to result in effective arms control;
- codify a Soviet nuclear preponderance;
- undermine NATO's conventional deterrent by requiring withdrawal of US dual-capable aircraft; and
- serve long-standing Soviet political ambitions towards Western Europe, with the decoupling of the US from Europe as an essential first step.

Brezhnev's nuclear moratorium proposal made on March 16, 1982, attempted to codify their existing INF superiority and divide the US from its allies. Despite the moritorium, construction at SS-20 sites, begun prior to March 16, was continued and the total SS-20 force has increased from less than 300 to 333 missiles as of December 1982.

[Deleted]
[deleted].

D. Effect on Global and Regional Stability.

[Deleted].

1. Soviet Threat.

As previously discussed, the Warsaw Pact has over the years developed a large and growing capability in nuclear and conventional systems which has not been matched by the US and its NATO Allies. The scope of the WP effort is far more than the level and capability required for defense. Deployment of the

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mobile, multiple-warhead SS-20 is particularly unsettling. From the NATO perspective, a failure to counter this threat, either by the deployment of PII and GLCM or the achievement of an acceptable arms control agreement, would be highly destabilizing.

2. System Characteristics and Deployments.

Official NATO and US strategy is deterrence and flexible response to pose to an aggressor risks and potential costs that outweigh the gains he might hope to achieve. This requires the ability to respond appropriately to any level of aggression and to escalate as necessary in order to deter aggression against NATO and to protect or restore the integrity of NATO territory should deterrence fail. NATO's longer-range INF missile modernization program will improve the credibility of NATO's deterrent posture in the face of the Warsaw Pact intermediate-range nuclear force buildup and, consequently, should strengthen regional and global stability. Moreover, since it is US and NATO policy that modernization of NATO's nuclear systems should not take precedence over modernization of conventional forces, there will be no increased dependence on nuclear weapons resulting from such deployments. Indeed, the December 1979 decision explicitly recognizes that LRINF modernization does not increase the role of nuclear weapons in NATO's deterrent posture.

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[deleted]. Consequently, the credibility of NATO nuclear options would be strengthened. [Deleted]. These systems like other US/NATO systems would be designed to operate according to clearly established command and control procedures [deleted].

Additional factors affecting stability and deterrence with the possible introduction of the PII and GLCM systems are their ranges, flight times, the numbers deployed, and survivability:

- The cruise missile's range is a significant factor from a military standpoint and could be from an arms control point of view as well. With an operational range of 2,500 kilometers, GLCMs based in the UK could reach targets in the Western USSR, and, if based in the FRG, could reach beyond Moscow. By holding at risk targets in the USSR, the Soviets are denied the hope of maintaining their territory as a sanctuary.

- With their relatively slow flight times, current generation cruise missiles do not represent a first-strike threat to the Soviet Union. Rather, cruise missile deployments symbolize a second-strike capability which should have a stabilizing effect.

- The flight time for PII at its maximum range of [deleted].

- The number of PERSHING IIs to be deployed (108) is far too low to constitute a first strike threat to the extremely large number of Soviet strategic forces and installations. [Deleted].

[Deleted].

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Stability and deterrence will be affected by other factors as well. PERSHING, for example, is an existing system, currently deployed in Europe. Upgrading its capabilities and extending its range would represent a modernization effort in the context of existing NATO deterrent strategy as opposed to the introduction of a new system.

3. Soviet Responses.

While modernized US INF contribute to stability in many respects, assessment of their net effect on stability also must incorporate potential Soviet reactions during peacetime.

Clearly, the Soviets are worried about the prospects of PII and GLCM deployment. The USSR might react to NATO's prospective longer-range LRINF missile deployments with additional weapon programs and further diplomatic activity of its own in Western Europe directed at turning Allied governments against modernization. In a March 1982 speech to the Congress of Trade Unions, President Brezhnev warned that if the US carries out its plan to deploy missiles in Europe, the Soviet Union would be compelled to take retaliatory steps that would put the other side, including the US, in an "analogous position." On the other hand, the Soviets only became willing to engage in substantive arms control negotiations when the prospect of Western deployments became real.

4. Allies' Perceptions and Reactions.

[Deleted].

NATO's decision to modernize its longer-range INF missiles is directed toward lessening perceptions of gaps in

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the continuum of NATO capabilities and to enhance deterrence, Alliance cohesion, and stability.

E. Technological Implications.

The major technological impact of current INF modernization programs is likely to be their effect on the weapons acquisition policies of other countries.

While the increased capabilities of advanced cruise missiles might make their production militarily and politically attractive to some nations, because of the high technology required and the high development costs, it seems unlikely that, except in a few cases, such programs are likely to be undertaken. [Deleted]. The current non-US systems could undoubtedly be upgraded, but the limited research, development, and production bases of many nations, coupled with the high cost of developing advanced cruise missiles, make them an unattractive acquisition option for all but a few. Manned aircraft continue to present more readily available and sufficiently flexible delivery systems to meet the present needs of most states.

[Deleted]
[deleted].

Other countries may intend cruise missiles for less demanding missions than the US. In such cases, development of relatively unsophisticated cruise missiles could be seen as being practical. Development of cruise missiles similar to ours, however, could present formidable technical obstacles to other states. In any case, the impact of the US decision to deploy cruise missiles on the incentives of our allies to assume a similar course is uncertain.

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[Deleted].

[Deleted]

[deleted].

It should be noted that, although the US air-launched cruise missile provides a major incentive for the USSR to pursue option "a" above, the USSR already has considerable incentives in this regard, and is clearly moving in that direction.

[Deleted].

F. Potential Interaction with Other Programs.

As discussed previously, LRINF are important to deterrence because they constitute a link between conventional capabilities and US strategic forces. These two systems complement short-range nuclear systems. [Deleted]. The range of options resulting from conventional, nonstrategic nuclear, and strategic nuclear forces provides a means to control escalation and stop conflict at the lowest level possible should deterrence fail. Additionally, the flexibility of these nuclear forces strengthens stability.

Moreover, the increased survivability of PII and GLCM would allow the West to put relatively less dependence on aircraft for the delivery of nuclear weapons, thereby releasing some aircraft for conventional roles.

Underlying this discussion is the need to improve NATO's deterrent posture and allay concern over inadequacies in NATO's longer-range nuclear capabilities, [deleted]. New deployments of LRINF systems will strike a balance, by reassuring Allies and enhancing deterrence by providing more effective INF.

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G. Verification.

Arms control agreements with a highly secretive adversary like the Soviet Union cannot be based simply on trust. There must be effective means of verification that enable the US to know with confidence whether the terms of agreements are being honored. In practice, this means the US must be able to monitor activities in the areas covered by these treaties in order to detect any violations at a very early stage. Even if the Soviets accept US INF proposals to eliminate longer-range INF missiles, there will remain a continuing requirement to monitor the large family of existing ballistic and cruise missiles to ensure that the Soviets do not undertake covert actions in violation of the treaty.

In the past, the US relied primarily on national technical means (NTM) of verification. As arms control agreements, the systems they cover and the possibilities of concealment become more complex, it may be necessary to supplement NTM with some form of "cooperative" measures of verification. The Reagan Administration has made it clear that the US will insist on provisions which would ensure effective verification of any agreement. These procedures will include measures beyond national technical means, if necessary, to achieve US verification objectives.

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[deleted].

[Deleted].

[Deleted].

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VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Both the PERSHING II and GLCM programs are consistent with US arms control policy and related Presidential decisions and are not constrained by existing arms control agreements.

The effect of US modernization programs on current and prospective arms control negotiations has already been demonstrated in the INF talks. In the face of Allied resolve to go forward with INF deployments, the Soviets dropped their preconditions for entering into negotiations with the US. US modernization programs could engender further modernization of Soviet INF. On balance, however, there would be little prospect for concrete arms control results involving INF in the absence of NATO's decision to modernize these forces.

Deployment of US PII and cruise missiles is intended to redress a dangerous imbalance caused by the Soviet deployment of large numbers of highly capable SS-20 missiles, in addition to existing Soviet LRINF weapons. Thus, US and NATO modernization, in the absence of concrete arms control results, is designed to enhance global and regional stability, both militarily and politically. While the Soviets could take military steps that would further aggravate LRINF imbalances, we are working in Geneva, in close consultations with our Allies, to seek an arms control solution.

The technological implications of these programs are likely to be [deleted]

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[deleted].

PII and GLCM have synergistic effects with each other, battlefield tactical nuclear systems, and other nuclear weapons. INF interact with both conventional and US strategic forces in the doctrine of flexible response, providing for enhanced deterrence and the possibility of escalation control should deterrence fail. They also allow overall improvements to the survivability and stability of NATO's theater nuclear posture. The Alliance's decision on new longer-range INF missile systems strikes a balance so as to enhance deterrence by providing NATO with more effective LRINF, while not undermining the credibility of the US strategic commitment to NATO, nor unnecessarily provoking Soviet responses detrimental to Western security.

NATO's decision to modernize its longer-range INF missiles provides for the deployment of PERSHING II and GLCM, without increasing the current nuclear weapons stockpile in Europe. The modernization decision includes a parallel NATO decision on an arms control approach to the Soviet Union involving LRINF.

With respect to potential future arms control agreements, [deleted].

In summary, the US PERSHING II and GLCM programs are important to deterrence and stability. Like any nuclear modernization program, however, they entail political costs and carry with them important arms control implications. In this regard, we will continue to ensure that these programs are consistent with our overall national security objectives, including the development of future options for limiting nuclear arms to ensure deterrence and global stability.

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SHORT-RANGE NUCLEAR FORCES

I. INTRODUCTION

This arms control impact statement (ACIS) addresses the following Department of Defense (DOD) and Department of Energy (DOE) programs:

PE Number	Program Title
Procurement	W79-1 Warhead (8-inch) (DOE)
Procurement	8-inch Nuclear Projectile (DOD)
Development & Procurement	W82 Warhead (155mm) (DOE)
64603A (D385) & Procurement	Improved 155mm Nuclear Projectile (DOD)
63320A (D302)	Corps Support Weapon System (DOD)

Short-range Nuclear Forces--dual-capable artillery and short-range missiles--comprise the lower end of the spectrum of US nuclear weapons; [deleted]. These weapons are an important component of NATO's military forces and the US nuclear deterrent posture which also includes intermediate-range and intercontinental systems. They are intended to enhance deterrence by posing the credible option of their effective use on the battlefield in direct defense or deliberate escalation against front line Warsaw Pact forces should the Pact engage in a nuclear conflict, or should NATO forces be unable to maintain a conventional-only defense against a Pact attack. Their existence also serves to enhance conventional defense effectiveness by denying an aggressor the option of massing forces to overwhelm our defenses without risking the

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creation of lucrative nuclear targets. These weapons support NATO's strategy of flexible response which is intended to deter war by posing the credible threat that a conflict in Europe could be escalated in a controlled way to seek its termination. [Deleted].

These new warheeds are designed to improve various performance characteristics of nuclear artillery projectiles and the LANCE missile. They would make possible greater range, responsiveness, reliability and accuracy [deleted]; more secure and responsive command and control, and command disable capability; and greater safety than existing warheads. The addition of an ER capability makes possible a reduction in the blast and thermal yields of these weapons compared to the yields of their predecessors. This would reduce the potential for collateral damage* to civilians, friendly military forces and facilities should these weapons be used. At the same time the weapons' lethal radius would be maintained or improved through an enhanced emission of radiation.

On April 7, 1978, former President Carter directed that modernization of the LANCE and 8-inch artillery-fired atomic projectiles (AFAPs) should proceed, with the ultimate decision concerning incorporation of the enhanced radiation feature to be made later. On October 18, 1978, President Carter announced his decision to proceed with the production of the LANCE and 8-inch AFAP warheads using designs which would permit their subsequent conversion to ER warheads. In addition, to maintain the option of installing ER elements later, some of the [deleted] ER components

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* Collateral damage is broadly taken to mean any form of undesired damage including civilian casualties and damage to the civilian infrastructure produced by the effects of friendly nuclear weapons.

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were to be produced and stockpiled in the US [deleted]. This was not a decision to produce ER weapons. On August 6, 1981, President Reagan announced that ER weapons would be produced and stockpiled solely on US territory. Any decision to deploy ER warheads would be taken only after close consultation with any country on whose territory they would be based, and then only with the explicit approval of the President.

II. PROGRAM DESCRIPTIONS

Technical characteristics of existing and proposed warheads of US short-range nuclear systems are summarized below.

A. <u>8-inch Artillery-Fired Atomic Projectile (AFAP) (W79-1 Warhead/M-753 Projectile)</u>.

1. <u>Program Characteristics</u>.

The 8-inch howitzers are dual-capable artillery, able to deliver either conventional or nuclear projectiles. The M-753 AFAP which incorporates the W79-1 warhead was developed to replace the current nuclear 8-inch projectiles deployed with US and NATO artillery units. Under President Reagan's August 1981 decision, the W79-1 warhead will be stockpiled on United States territory.

The W79-1 warhead [deleted]. The W79-1 is designed to provide improved safety and security in arming, storage, handling and operational use. The Category D Permissive Action Link (PAL) built into the warhead will improve protection against unauthorized arming of the projectile. [Deleted].

The principal features of the new 8-inch AFAP which would contribute to its greater effectiveness are increased delivery range, more accurate fuzing, and reduced response time. The present 8-inch round initially entered the US inventory in 1956; [deleted]. The present round makes [deleted].

The relatively short [deleted] range of the existing projectiles makes the 8-inch firing unit potentially more vulner-

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able to suppressive fire and conventional attack. The new projectile would increase the range to [deleted], not only increasing targeting flexibility and counterbattery capability, but also survivability. The new 8-inch AFAP would allow positioning of batteries further from the forward line of own troops (FLOT) while at the same time improving area coverage of enemy targets [deleted].

[Deleted].

2. Program Status.

[Deleted]. Full-scale production of the W79-1 [deleted].

B. 155mm Artillery-Fired Atomic Projectile (AFAP) (W82 Warhead/XM-785 Projectile).

1. Program Characteristics.

The 155mm howitzers are dual-capable artillery, able to deliver either conventional or nuclear projectiles. The XM-785 AFAP incorporating the W82 warhead is intended to replace the current 155mm nuclear projectile deployed with US and NATO artillery units. No decision has been made concerning deployment or stockpiling of the 155mm AFAP.

NATO members generally have about four times as many 155mm artillery tubes as 8-inch artillery tubes (for example, the Central Region currently has approximately [deleted] tubes of 155mm artillery and approximately [deleted] tubes of 8-inch artillery). Most 8-inch units are currently certified for nuclear rounds, as are about [deleted] percent of the 155mm howitzer units; this percentage is expected to rise somewhat with the fielding of the new 155mm AFAP and a new family of NATO 155mm howitzers. These larger numbers of 155mm nuclear capable artillery pieces would help assure the survival of a substantial short-range nuclear capability in the event of a Warsaw Pact conventional attack or nuclear strike. A

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broadly based 155mm nuclear capability prevents the Pact from focusing its attack on the less numerous 8-inch artillery.

[Deleted].

In September 1977, DOD formally requested DOE to initiate development engineering (DOE Phase 3) of the W82. The Phase 3 request stated that the new warheads should be [deleted].

The [deleted] warhead yield is expected to be [deleted].

The designers of the W82/XM-785 have taken advantage of technology developed in the 8-inch AFAP program to [deleted] [deleted] include radar fuzing, rocket-assisted propulsion, and ballistic similitude with conventional ammunition and a rugged design which is compatible with modern high-performance artillery tubes.

As in the new 8-inch AFAP, command and control of the new warhead would be improved by the use of a Category D PAL system. [Deleted]. Modernization of safety features are also included in the new projectile.

2. <u>Program Status</u>.

Development engineering (DOE Phase 3) began during FY 1978. As a result of DOD and DOE budget constraints, the priority of the 155mm AFAP development was lowered resulting in the IOC being delayed. [Deleted]. The production completion date [deleted]; however, Congressional action on the DOE FY 1983 budget may result in further delay.

[Deleted].

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[Deleted].

The FY 1984 planned program calls for continuation of the Development Testing II/Operational Testing II phase and the conduct of a series of Development Acceptance In-Process Reviews for type classification of Army components.

C. LANCE W70 Mod 3 Warhead.

1. Program Characteristics.

The LANCE is a mobile, surface-to-surface, ballistic missile system having a range [deleted] which can provide tactical nuclear (or conventional [deleted]) artillery support on the battlefield under all-weather conditions and other visibility limitations (given effective target acquisition).

The W70 Mod 3 (W70-3) warhead produced for the LANCE is a [deleted].

As with the W79-1 warhead, all LANCE system Mods provide improved safety and security in arming, storage and handling. All W70 series warheads include a command disabling feature, which would permit them to be disabled nonviolently [deleted] to prevent unauthorized use. [Deleted].

2. Program Status.

The LANCE modernization program [deleted].

D. Corps Support Weapon System (PE 63320A).

1. Program Characteristics.

The Corps Support Weapon System (CSWS) is an Army program in the Concept Definition Phase to explore development of a corps-level replacement for the LANCE Missile System and to provide improved range, accuracy, survivability and responsiveness. The Mission Element Need Statement (MENS) for the CSWS which was approved in April 1981 is as follows:

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> There is a need to attack targets at ranges beyond the capability of cannons and rockets with conventional, nuclear, and chemical weapons in order to destroy, neutralize, disrupt, or delay enemy forces (mobile, stationary, fixed). By slowing down the enemy's ability to reinforce and support the central battle, friendly forces can overcome the expected unfavorable force ratio.

The range of the CSWS is intended to be [deleted] that of the LANCE. It is the nuclear role that makes the CSWS eligible for inclusion in this ACIS.

A Special Task Force (STF) was established in March 1981 at the US Army Field Artillery Center, Fort Sill, Oklahoma, to manage the CSWS program during the Concept Definition Phase.

2. Program Status.

The STF is evaluating viable alternatives (e.g., Multiple Launch Rocket System derivatives, LANCE missile variants, PATRIOT missile variants, ground-launched cruise missile, wheeled versus tracked loader-launchers, etc.) to ensure the system selected best meets the needs described in the MENS. The FY 1984 planned program calls for preparation for, and completion of, the initial system acquisition milestone review and initiation of the validation and demonstration phase. On June 30, 1982, the Secretary of Defense directed the establishment of a joint Army/Air Force missile program with the Army as the lead service. This program will merge Army and Air Force requirements and develop a common CSWS missile.

III. STATED MILITARY REQUIREMENTS

AFAPs and LANCE missiles are each designed to fill specific operational roles. Together, they provide unique capabilities not duplicated by other nuclear forces and provide NATO with a greater range of military options. As such, they contribute to the worldwide deterrence of nuclear and conventional aggression. Moreover, if deterrence fails, these weapons could enhance NATO's capability to use nuclear weapons effectively and with restraint.

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LANCE provides a capability for shallow interdiction of first and second echelon forces located beyond the range of nuclear cannon artillery. It thus complements the shorter range AFAPs. Its longer range and larger yield are best suited for strikes against semi-fixed and fixed targets, large concentrations of enemy forces massing for follow-on attacks, and materiel-type targets.

If the CSWS replaces the present LANCE system, it would be expected to assume the nuclear missions currently assignad to LANCE. [Deleted], it would not be sufficient to strike targets in the Soviet Union from countries where the LANCE is deployed.

Reviews of short-range nuclear systems since the 1960s have indicated that improved short-range nuclear systems are required. The current systems (8-inch and 155mm AFAP) are limited in range and when compared to the improved systems, have less military effectiveness. Modernization requirements for LANCE and AFAPs include safety, security, flexibility, and more effective military application. [Deletad].

As compared to the SERGEANT and HONEST JOHN missiles it replaced, LANCE has improved accuracy, [deleted] [deleted] and has greater range than the HONEST JOHN. It also makes possible quicker reaction times than the older systems. [Deleted].

The W70-1,-2 warhead now deployed for LANCE, does not provide as great a degree of flexibility or operational effectiveness as the W70-3 LANCE warhead which is a production change from the W70-2 warhead. The W70-3 [deleted]. This modification provides greater flexibility to the LANCE system which is particularly important for ranges beyond that of the 8-inch W79-1/M-753 projectile.

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Missiles are necessary, but are not the only weapons needed to fulfill the missions assigned to short-range nuclear systems. As compared to dual-capable artillery, the relatively small number of LANCE launchers (and the expense of increasing that number), its lower rate of fire, and the larger distance required for minimum troop safety, limit the potential use of LANCE against a variety of targets in the forward battle area. Moreover, as compared to cannon artillery, missile systems which are deployed in fewer numbers require greater dependence on concealment, deployment in-depth, frequent movement, and communications security for their survivability.

DOD requirements for increased range, greater accuracy, more responsive command/control, greater safety, and reduced collateral damage are all reflected in the design of the proposed new rounds.

Further, Soviet short-range nuclear forces like their longer-range counterparts, are undergoing rapid modernization.

--The Soviets have developed the new SS-21 missile to replace or augment the older FROG rockets. The SS-21, with its increased range and accuracy, represents a significant qualitative improvement over the FROG. This will allow expansion of target coverage, increased survivability, the use of warheads in closer proximity to their own forces, and increased probability of hitting intended targets.

--With respect to nuclear artillery, the Soviets have introduced new self-propelled 203mm and 240mm systems that provide increased mobility, greater rate of fire, and longer range.

[Deleted] it should be noted that the new US short-range nuclear systems have not been developed in response to these specific developments, but rather in concern over across-the-board improvements in Pact military capabilities.

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IV. FUNDING ("then year" $ in millions)*

	FY 82 & Prior	FY 83	FY 84	FY 85 (Est)	FY 86 to Completion	Total Dev.	Total Prod.	Total Units	Unit Cost	Total Program Cost
W79-1 Warhead (8-inch, DOE)										
Development $	[									
Production $										]
8-inch Improved Nuclear Projectile										
Development $										
Production $										
W82 Warhead (155mm, DOE)										
Development $					[Deleted]					
Production $										
Improved 155mm Nuclear Projectile (PE 64603A - Project D385)										
Development $										
Production $										
Corps Support Weapon System										
Development $										
Production $	[									]

* Sources: DOD; DOE.

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

The modernization programs for short-range nuclear systems described in Part II of this ACIS are consistent with US arms control policy. In the absence of verifiable international agreements to reduce nuclear stockpiles, there is a need to retain and modernize US theater nuclear capabilities, especially those which support NATO's strategy of flexible response.

In discussing the relationship between arms control policy and the modernization of short-range nuclear weapons, the following analysis considers the overall effects of the projectile/ warhead programs for the W70-3, W79-1, and W82; [deleted].

1. Overall effects.

In its strategy, NATO has confirmed the role of dual-capable short-range artillery which can fire nuclear projectiles; these weapons are specifically supportive of the NATO doctrine of flexible response. The effective implementation of NATO doctrine in a manner consistent with announced strategy contributes to stability in Europe--an arms control objective. The modernization of these warheads is consistent with arms control goals. Improvements in range, accuracy, [deleted], control, and security features--all of which characterize the new warheads--represent evolutionary changes in existing weapons. These improvements are unlikely to affect significantly existing perceptions of these weapons or their relationship to US arms control efforts.

[Deleted]. The improved command, control, and security features of both the modernized AFAPs and the current and modernized

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LANCE also should reduce the possibility of an unauthorized nuclear use. The direct result of improving the range of the 8-inch and 155mm AFAPs is greater survivability potential resulting in enhanced deterrence, increased stability, and the possibility of lower absolute numbers of deployed systems. In these ways, the short-range nuclear weapon programs are consistent with US arms control objectives.

2. Effect of [deleted] 155mm AFAP.

In the case of the 155mm AFAP, the fact that the new AFAP [deleted]

does not detract from this assessment of consistency with US arms control policy. The [deleted] is necessary for enhanced military effectiveness. [Deleted] achieving ballistic similitude with the new AFAP and thus improving delivery accuracy could ameliorate the problem so it [deleted]. More importantly, the increased effectiveness of the 155mm AFAP should strengthen deterrence.

3. Effects of incorporating enhanced radiation.

[Deleted]. Responsible US officials have stated repeatedly that ER weapons would remain under the same strict political control as any other nuclear weapon. It is the US position that enhanced radiation weapons do not lower the nuclear threshold and that they represent evolutionary rather than revolutionary modernization of short-range nuclear systems. In any case, such weapon modernization is neither precluded by any existing treaty or policy, nor proposed for arms control negotiations.

Additionally, the existence of more effective nuclear weapons with lower collateral damage potential and fewer expected civilian casualties may be perceived by adversaries to increase

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the credibility of the NATO deterrent. In this event, availability of ER warheads would increase deterrence of war overall, but at the same time could increase Soviet concern regarding the use of nuclear weapons if they have decided to go to war. This is, of course, the dilemma of nuclear deterrence, which must contain some threat of use to be credible. It is, however, NATO policy not to place greater reliance on nuclear weapons for either deterrence or warfighting.

B. Relation to Arms Control Agreements.

Article VI of the Non-Proliferation Treaty (NPT), to which the US, USSR, and 117 other countries are parties, states:

> Each of the Parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament,...

Representatives of many non-nuclear-weapon states party to the Treaty have stated that they agreed in Article II of the Treaty to forswear developing or acquiring nuclear weapons in part in return for this pledge in Article VI by the nuclear-weapon state parties.

In keeping with Article VI, the US has participated in arms control negotiations relating to the limitation and reduction of nuclear weapons, such as SALT, and is now participating in Intermediate-range Nuclear Force (INF) negotiations and Strategic Arms Reduction Talks (START).

Despite these efforts, many of the nonaligned nations at the 1980 NPT Review Conference argued that there had been

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an intensification of the US-USSR nuclear arms race since the NPT entered into force in 1970, and that these developments were contrary to Article VI. The 1980 Review Conference was unable to achieve a consensus on a final declaration. The non-aligned group's publicly stated position was dissatisfaction with progress by the nuclear-weapon states in meeting the arms control obligations of Article VI. There was, however, a consensus on the value of the NPT and of barriers against proliferation of nuclear weapons.

Unilateral US nuclear modernization restraint would not eliminate criticism from non-nuclear-weapon states for lack of arms control progress, especially since some of this criticism is a product of extraneous political factors. Moreover, such unilateral restraint could weaken the credibility of the US deterrent for those countries that rely on the US nuclear umbrella.

The US is not party to any treaty or other legal obligation that would inhibit the development, production or deployment of short-range nuclear weapons.* Development of these weapons is not affected by the provisions of the yet to be ratified Threshold Test Ban Treaty.

The features intended to improve the security of, and help guard against, accidental or unauthorized use of the

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* The provisions of Articles I and II of the Non-Proliferation Treaty, while not addressing deployment specifically, require that these nuclear weapons remain under US control.

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W70-3, W79-1, and W82 warheads are supportive of the obligations incurred in the 1971 "Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics."

There is no customary rule of international law or international convention which generally prohibits the use of nuclear explosive weapons.* It is the US understanding, placed on record at the time of signing, that the rules established by the recently concluded Additional Protocol I to the 1949 Geneva Conventions** were not intended to have any effect on, and do not regulate or prohibit the use of nuclear weapons. The Protocols are currently under interagency review to determine whether or not they should be submitted to the Senate for its advice and consent to ratification. In the event of ratification, the US is considering reaffirming the statement.

C. <u>Effect on Current and Prospective Negotiations</u>.

[Deleted]

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* The United States has agreed to restrict its use of nuclear weapons in various arms control agreements--specifically, agreements not to use nuclear weapons in Latin America (additional Protocol II, Article 3 of the Treaty of Tlatelolco), or agreements not to deploy nuclear weapons as specified in Article IV of the Outer Space Treaty, Article V (1) of the Antarctic Treaty and Article I (1) of the Seabed Arms Control Treaty.

** Adopted on June 8, 1977, by the Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts, also known as the Law of War Conference.

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[deleted]. US negotiations with the UK and the USSR to prohibit all nuclear weapon tests began in October 1977, but have been inactive since December 1980. A Comprehensive Test Ban (CTB) continues to be a long-term objective of US arms control policy. However, there are serious concerns about the national security implications of a CTB under current circumstances, including our ability to verify Soviet compliance with such an agreement. It should be recognized that nuclear testing plays a very important role in ensuring a credible US nuclear deterrent. The United States uses nuclear testing to develop new nuclear weapons, to confirm the reliability of stockpiled weapons, to improve the safety and security of weapons against accidental or unauthorized detonation, and to assess the vulnerability of military systems to nuclear effects. For these reasons, the President has decided not to resume the trilateral CTB negotiations initiated under the previous Administration, but suspended since November 1980. However, the US will continue to participate in discussions on ways to improve verification and compliance related to nuclear testing issues in a special working group of the Committee on Disarmament in Geneva.

Neither side has proposals on the table at the Mutual and Balanced Force Reduction talks in Vienna that would constrain the modernization of short-range nuclear weapons.

In the INF negotiations, in progress since November 1981, the US has tabled a draft treaty that calls for reciprocal elimination of all Soviet and US ground-based INF missiles of longer-range. [Deleted].

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The Soviet Union has sought to gain propaganda advantages by proposing that the United States and the USSR mutually renounce the development and production of ER weapons. Such an agreement [deleted]. More importantly, such an agreement would provide asymmetrical advantages to the Soviet Union. Although they also have offensive application, the principal value of ER weapons lies in their potential use to defend against an armored offensive, a problem facing NATO but not the Warsaw Pact. In discussions with a group of US Senators, Brezhnev stated that the Soviets tested but never started production of a neutron bomb. [Deleted] [deleted]. For reasons such as these, the United States has viewed the Soviet mutual renunciation proposal as propaganda.

D. <u>Effect on Global and Regional Stability</u>.

The US believes that nuclear forces play an important role in the defense of NATO. NATO's strategy of flexible response provides a variety of theater nuclear options in support of diplomatic and military efforts to bring the conflict to early termination on terms acceptable to the US and her allies.

[Deleted]. Modernization of NATO's short-range nuclear weapons would demonstrate our determination to maintain a continuing effective deterrent. Improvements in US conventional capabilities together with modernization of NATO's nuclear forces would be seen as concrete evidence of the US commitment to the defense of Europe. As with any other nuclear weapons, the decision to use short-range nuclear forces would be made at the highest political levels.

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In the event of any decision to deploy ER weapons, full consultations would take place with any ally on whose territory such weapons would be based.

E. Technological Implications.

The new short-range nuclear weapons are not likely to significantly affect East-West competition in military technologies. NATO has had small-yield artillery weapons in its stockpiles since the late 1950s; the Soviet Union possesses rockets (FROG series) with nuclear warheads and [deleted].

The effect on technological competition with the USSR of the decision to produce RB/ER weapons is not yet known. Soviet leaders have stated that they would produce these weapons if the US did. [Deleted].

Former French President Valery Giscard d'Estaing, at his press conference on June 26, 1980, announced that France had developed and tested a prototype of a neutron warhead and would be ready in two or three years to decide whether to produce it. On September 14, 1981, Prime Minister Pierre Mauroy declared that the Mitterand Government would continue research and development on neutron weapons in order to preserve the nuclear independence of France. According to the French press, France exploded a neutron weapon in the framework of its enhanced radiation weapons testing program on the Mururoa Atoll on March 21, 1982. In early October 1982, Mitterand replied to an article in The New York Times on the French neutron weapon by noting that it is inaccurate to say that the French have decided on production of a neutron warhead. Rather, the French Government is continuing research and development of the warhead only.

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[Deleted]. An unclassified Chinese publication indicates that [deleted].

F. Potential Interaction with Other Programs.

Nonstrategic nuclear forces are important to deterrence as a link between conventional capabilities and US strategic forces. The short-range nuclear weapons represent one end of this spectrum of nuclear deterrence--through the threat they pose to Warsaw Pact front-line troops.

Modernized short-range weapons would add to the military effectiveness of nonstrategic nuclear forces. This overall effectiveness of nonstrategic nuclear forces would be enhanced by

incorporation of enhanced radiation features in certain short-range nuclear weapons. These RB/ER weapons are designed to increase the vulnerability of massed Warsaw Pact tank forces in the Western and Eastern European area.

In accordance with standard DOE practice, the nuclear material which will be recovered upon retirement of the currently deployed 8-inch and 155mm AFAP would be available for use in the production of new and replacement warheads for the nuclear weapons stockpile.

G. Verification.

At the present time, no arms control agreements limit short-range nuclear forces. [Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Modernization of NATO short-range nuclear weapons is consistent with US arms control policy and would not be affected by existing or prospective arms control agreements. Improvements planned for these weapons could increase NATO's capability to deter a conventional or nuclear attack by the Warsaw Pact. Moreover, if deterrence fails, these weapons could enhance NATO's capability to terminate the conflict at the lowest possible

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level. In the event of any decision to deploy ER weapons, full consultations would take place with any ally on whose territory such weapons would be based.

These modernized weapons provide significant improvements in the range, accuracy and reliability of warhead yield in the case of AFAPs, and for both LANCE and AFAPs provide improvements in command and control, as well as safety and security improvements over older nuclear weapons. They, therefore, contribute to stability through greater operational control, survivability, reliability, and flexibility in use.

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CHEMICAL WARFARE

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) programs:

PE Number	Program Title
62622A	Chemical Munitions
62706A	Chemical/Biological Defense and General Investigations
62734A	Medical Defense Against Chemical Agents
63615A	Lethal Chemical Munitions Concepts
63720A	Chemical/Biological Detection, Warning, and Sampling Materiel Concepts
63721A	Chemical/Biological Protective Materiel Concepts
63751A	Medical Defense Against Chemical Warfare
63752A	Demilitarization Concepts
63764A	Medical Chemical Defense Life Support Materiel
64610A	Lethal Chemical Munitions
64724A	Chemical/Biological Detection, Identification, Warning and Sampling Materiel
64725A	Chemical/Biological Protective Materiel
64757A	Medical Chemical Defense Life Support Materiel
65710A	Joint Chemical/Biological Point of Contact/ Test/Assessment
63745F	Chemical Warfare Defense
64601F	Chemical/Biological Defense Equipment
62764N	Chemical, Biological, and Radiological Defense Technology
64506N	BW/CW Countermeasures
64604N	Chemical Warfare Weapons
Procurement	Chemical Defense Equipment
Procurement	Chemical Retaliatory Capabilities
O&M	Stockpile Maintenance
O&M/MILCON	Demilitarization

US ratification of the Geneva Protocol and the Biological Weapons Convention (BWC) underscores the US commitment to the objective of the complete, effective, and verifiable prohibition

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of all chemical weapons. The BWC obligates the states which are parties to the convention to continue negotiations towards prohibition of chemical weapons. The Administration has reconfirmed that the US will continue to support the eventual objective of concluding a complete and verifiable prohibition of chemical weapons production, development, and stockpiling, recognizing that for the foreseeable future such a prohibition would be unverifiable by national technical means alone and that other measures, including on-site inspections, would be required. From 1977 to 1980, interagency reviews resulted in Presidential decisions to place maximum emphasis on chemical weapons arms control and to maintain our chemical warfare (CW) deterrent retaliatory forces without force improvement. Against the background of a continuing CW threat and a lack of sufficient progress in arms control, the Congress, at their own initiative, authorized FY 1981 funding to construct the initial phase of an Integrated Binary Munition Production Facility. In a FY 1981 supplemental, the Administration sought and Congress provided funding to equip the initial binary chemical weapons production facility for the 155mm binary artillery projectile. Consistent with these decisions, the Administration's FY 1983 budget submission contained funds ($54M) for procurement of binary chemical munitions: the 155mm binary artillery projectile and the BIGEYE aerial binary bomb. However, after intensive debate, a House-Senate Conference Committee deleted without prejudice binary production funds which included $24M for commercial

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facilitization. Further, the Administration was informed that the Joint Conference agreed "that if the President believes the authorization of funds for binary weapons production in FY 1983 to be of sufficiently high priority, the Committee will give consideration to a reprogramming action." These funds are still required and an appropriate request for funding will be made to the Congress.

FY 1976 authorization legislation required Presidential certification and notification to Congress before binary weapons could be produced. On February 8, 1982, President Reagan certified to the Congress that production of binary munitions was "essential to the national interest."

When the House/Senate Conference addressed BIGEYE funding ($1.87M) in the FY 1981 Revised Supplemental, the Conference Committee agreed to fund initiatives in chemical weaponry, but directed the Administration to provide a report concerning the total program and issues of concern to Congress before beginning production. The DOD provided the Report to Congress on the United States Chemical Warfare Deterrence Program in March 1982, both in response to this requirement and as the report in conjunction with the President's certification. This report concluded that in view of the overall military balance between the US and the Soviets, we cannot rely on other components of our military capabilities -- in particular nuclear weapons -- to deter chemical warfare and that we have been unable to eliminate the threat through negotiations or unilateral US restraint. Consequently, to deter chemical

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warfare, the US must improve both its defensive and retaliatory capabilities. Consistent with the report, the FY 19 83 budget for CW defense accounted for 72% of the $705M total request, 17% was for retaliatory programs, and 11% was for demilitarization of obsolete and hazardous chemical munitions. The defensive program placed emphasis on acquisition of CW defense equipment, CW research and development, improving CW force structure, increasing CW training, and upgrading our CW intelligence collection and analysis capability. Except for minor adjustments, the Congress fully supported these requests. However, reflecting some concerns that the information provided had been insufficient with respect to allied views, Senator Hatfield introduced an amendment to the 1983 Defense Authorization Bill which would restrict binary production to US requirements only, unless NATO allies requested such munitions. The Amendment, which was deleted along with production funds, would also have required that a serviceable artillery round be made militarily useless for every binary artillery projectile produced, thus demonstrating the desire to have the smallest stockpile necessary.

The proposed FY 1984 CW Programs will continue the FY 1983 initiatives (i.e., active Research, Development, Test & Evaluation (RDT&E) for both deterrent retaliatory and defensive CW needs; procurement of an improved protective CW capability; initiation of the modernization of the US deterrent retaliatory capability; development of the capabilities to dispose of the

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deteriorating chemical agent stockpile; and maintenance of currently stockpiled chemical munitions) and provide the basis for this analysis. These programs support the US objective of maintaining adequate defensive and deterrent retaliatory capabilities, as well as increasing the safety and usability of the systems involved. These programs also contribute to the goal of eventually concluding a complete and verifiable prohibition of chemical weapons development, production and stockpiling by providing a more credible deterrent and placing the US in a better posture for negotiations. This objective is to be met by:

- Developing and procuring equipment and material that will enhance immediate survival and reduce degradation of combat effectiveness during sustained operations;

- Creating force structure that supports the training and defensive aspects of the program and provides reconnaissance and decontamination capabilities;

- Updating doctrine on how to survive and continue to fight in a contaminated environment;

- Training individuals and units so their response to a chemical attack is automatic and precise and their discipline is maintained while in a contaminated environment;

- Having intelligence support essential to shaping our own capability to produce current and projected estimates of enemy CW capabilities;

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- Obtaining and maintaining a CW retaliatory capability sufficient to force an enemy into a protective posture and to bring the chemical conflict to an end as quickly as possible and at the lowest level possible; and

- Developing and maintaining the industrial base to provide a chemical warfare capability.

There cannot be a credible deterrent chemical capability without each of the above components. In addition, we must establish a capability to efficiently and safely dispose of the obsolete unitary chemical stockpile to reduce storage and security costs and to be able to comply with stockpile destruction requirements if a chemical weapons arms control agreement is reachad in the future.

II. PROGRAM DESCRIPTIONS

A. Research, Development, Test & Evaluation.

The Army, as DOD Executive Agent for Joint Service CW RDT&E, has responsibility for conducting a coordinated interservice RDT&E program. This program provides the essential technology base upon which the Services can develop a CW deterrent posture, consisting of both retaliatory chemical weapons and chemical defense systems on an individual or joint basis to meet their military/operational needs. A Joint Development Objective Guide provides the basis for the technology program. In addition, the Army has published an Army Chemical Action Plan which identifies all actions required to achieve the needed CW posture. Building

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on this technology base, individual Services then fund engineering development programs to support their unique requirements. FIGURE 1 illustrates the interrelationship of the various CW programs. RDT&E efforts comprise about 40 percent of the total CW deterrence program funds.

For the purpose of this analysis the CW program will be discussed using the following subgroupings: Technology Base, RDT&E in Defensive Materiel, Medical Research, Technical Support of Agent and Munitions Development, Demilitarization and Field Test Activity.

1. Technology Base.

PE 62706A553 Chemical/Biological Defense and General Investigations - This program element supports the entire DOD chemical defense technology base. Exploratory development (XD) of a broad spectrum of equipment concepts is being conducted: (1) to acquire a technological base to counter the threat posed by potential enemy chemical agent/munition systems; (2) to enhance knowledge in all aspects of physical defense, including warning, detection, identification, decontamination, individual and collective protection against all threat agents, including toxins*; (3) to investigate chemical compounds of military interest; (4) to evaluate protection countermeasures, avoid technological surprise,

* Physical protection against toxins, as well as detection/identification is performed under this program element; the development of medical defenses is conducted under PEs 62770A and 63750A by the Army Medical Department.

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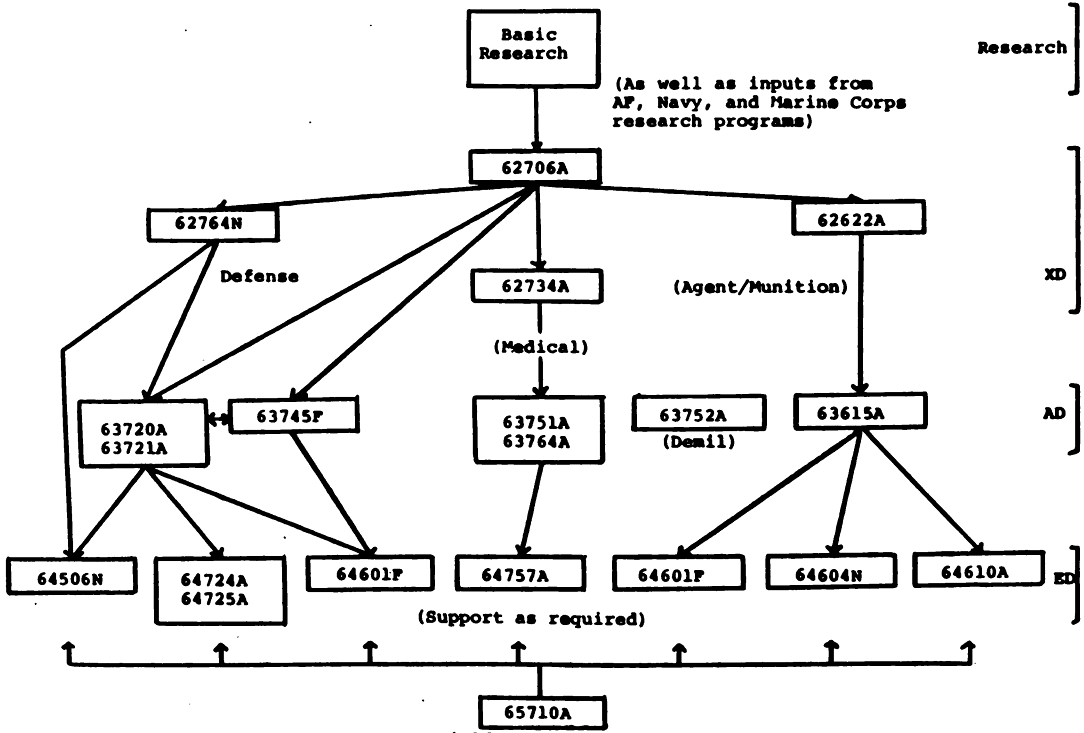
FIGURE 1: CW RDT&E PROGRAM FLOW



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and uncover leads for new simulant chemical agents; and (5) to study agents and methodology for the training of troops. This knowledge is usable in advancing the retaliatory chemical agent/munitions technology. This program includes investigations supporting defensive and retaliatory development in chemical dispersion and dissemination techniques, searches for potential chemical agents, and toxicology of chemical agents. During FY 1984, the effectiveness of protective and detection systems against all potential threat agents, including toxins, in tri-service environments will continue to be assessed. Major emphasis will be placed on new or novel decontamination concepts. Emphasis will continue on applying ionization principles in detector alarms and monitors. Laser applications for chemical agent detection, decontamination, and monitoring will be exploited. New initiatives in individual and collective protection will be undertaken. Efforts will continue to acquire safe chemical training agents with maximum similarity of response to actual CW agents.

PE 62622A552 Chemical Munitions - Investigations under this Army project provide the essential exploratory effort in lethal, incapacitating and riot control agents and munitions and the total technology base for DOD (no comparable work is done by the other Services): (1) Lethal Chemical Agents/ Weapons - encompasses applied research activities associated with physical and analytical chemistry of potential lethal chemical systems; exploratory development of binary lethal chemical agents of

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various degrees of volatility to be used with a variety of air or ground delivery munition types; and applied research leading to an understanding of phenomena which enhance the threat and effectiveness of these agents; (2) Incapacitating Chemical Agents/Weapons - includes the search for new, safe-to-handle incapacitants with the following properties: higher potency, shorter on-set time, shorter duration of effects, and percutaneous activity; development of effective means for exploitation of these agents; and identification of the physical and chemical characteristics of these agents; (3) Chemical Combat Support Systems - includes development and evaluation of new chemical compounds for use as riot control and CW agents, development of concepts for their use and the establishment of the feasibility of munitions responsive to the concepts. Specific efforts for FY 1984 would include: XD will continue on the binary concept for a chemical warhead for the Corps Support Weapon System; evaluation of potential dual-purpose (inhalation and skin penetration) lethal agents adaptable to binary delivery will continue;* application of intermediate volatility agents (IVA) to a family of ground missile, rocket and aerial delivered munition concepts will be investigated; investigations of chemical agent manufacturing processes and evaluation of

* The binary concept is a process which provides for the formation of a lethal chemical agent from two nonlethal constituents by means of a chemical reaction occurring only during flight of the munition to a target. Additional safety and security are achieved by adding the second constituent at the time of preparing the munition for use.

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environmental control mechanisms will continue; and efforts will continue on a 155mm incapacitating agent projectile.

PE 62764N Chemical, Biological and Radiological Defense Technology - This program element funds the Navy's efforts in a coordinated Joint Services chemical, biological, and nuclear radiation defense technology research program. It provides technical alternatives for Navy and Marine Corps operational requirements and for coordination with the Army and Air Force for defense procedures and equipment. The FY 1984 planned program in the area of chemical defense technology would complete analysis of new absorbants for air purification; complete development of an on-site test method for determining useful life of air filters used in collective protective systems; and complete development of a computer code to analyze system vulnerabilities that cannot be measured directly in order to estimate confidence limits on survivability levels.

2. RDT&E in Defense Materiel.

The use of toxins and other lethal chemical agents in Laos, Kampuchea, and Afghanistan has intensified the efforts to enhance the capability of US forces to fight in a chemically contaminated environment. The programs included in this subcategory are directed toward the development of a full spectrum of equipment and materiel required to sustain operations in a chemical environment. More specifically, they seek to provide: (1) improved chemical detection, warning and identification

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materiel and equipment; (2) effective individual and collective protection; and (3) the means to decontaminate personnel and equipment following a chemical attack. Specific efforts for FY 1984 are as follows:

PE 63720A Chemical/Biological Detection, Warning, and Sampling Materiel Concepts - Advanced development (AD) will be initiated in FY 1984 on the Nuclear/Biological/Chemical (NBC) Remote Detector which is a second-generation remote sensor based on laser principles and which will become a principal component of the NBC Reconnaissance System III (NBC RECON III). AD will continue on the Automatic Chemical Agent Detector and Alarm (XM22) and the Remote Sensing Alarm (XM21).

PE 63721A Chemical/Biological Protective Materiel Concepts - AD will be completed in FY 1984 on the Hybrid (combination ventilated face mask and positive pressure) Collective Protection Equipment. AD will be continued on the Personal Equipment Decontamination System. In addition, work on an Advanced Collective Protection System for vehicles, vans, and shelters would be initiated.

PE 63745F Chemical Warfare Defense - This AD program, a new start in FY 1982, is designed to alleviate basic medical and operational problems associated with CW operations. The program will demonstrate improved technology solutions to enhance Air Force capabilities to sustain operations and handle casualties in a CW environment. The FY 1984 planned program would include

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continuation of efforts to: (1) develop a prototype vital signs monitor for use in air evacuation missions; (2) develop air crew contamination control procedures; and (3) integrate chemical defense equipment with current life support equipment. AD will begin on a filtration system for use in aircraft cockpits, shelters, and walk-around personal breathing equipment. Emphasis will be placed on CW protection and operational capability improvements for the USAF Military Airlift Command's aeromedical evacuation mission. Miniature aircraft cockpit detectors will be completed and transitioned to engineering development (ED).

PE 64724A Chemical/Biological Detection, Identification, Warning and Sampling Materiel - ED will be initiated on the Automatic Liquid Agent Detector (XM85/XM86). In addition, ED will continue on training systems for chemical defense.

PE 64725A Chemical/Biological Protective Materiel - ED will continue on the Jet Exhaust Decontamination System; a new protective mask; Modular Collective Protection Equipment for vehicles, vans, and shelters; and Skid Mounted Decontamination Apparatus. ED will be initiated on an Interior Surface Decontamination System, Lightweight Decontamination System, Individual Decontamination Kit, and the Power Respirator.

PE 64601F Chemical/Biological Defense Equipment - This program element contains all ED of Air Force-unique defensive equipment. (There is one project within the PE that funds certification on Air Force aircraft of the Navy BIGEYE binary

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chemical weapon -- see PE 64604N, Section II A.) The FY 1984 program will continue development of an area detection system. Also in FY 1984 the third generation air crew protection system will reach early ED, the improved collective protection and decontamination systems will be in AD, and Air Force operational tests of a new joint-Service ground crew protective mask will take place.

PE 64506N BW/CW Countermeasures - This ED program will provide advance warning and automatic point detection of a CW agent attack and provide US Navy ships with a shipboard collective protection system option. Funds were approved in FY 1975 to develop a CW advance warning capability for US Navy ships utilizing the Forward Looking Infrared (FLIR) imaging principle. The detection of CW agents can be made with FLIR in its normal mode of operation. The major development effort is directed toward [deleted] CW agent identification and false alarm discrimination. It is planned that the chemical detection portion of this program would be completed in [deleted]. The automatic advance warning system will be comprehensively evaluated for detection, identification and discrimination capabilities in the at-sea and littoral environments for multiship application [deleted]. Shipboard installation of the automatic CW point detector, protective clothing and decontaminants began in [deleted]. In addition, installation of a shipboard chemical collective protection system for the LHA

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class ships will be completed and evaluation begun in [deleted]. (Collective protection is now required in all newly designed [deleted] and subsequent Navy ships.) Other improvements in clothing, masks, detectors, decontaminants, immunization, simulants, alarms and collective protection continue.

3. Medical Research.

These programs focus on efforts to provide an effective medical system for maximizing safety and survivability of the soldier on the chemically contaminated battlefield.

PE 62734A Medical Defense Against Chemical Agents - This restructured program supports the entire medical XD effort for the Army (the Executive Agency for this mission), and as such, must address joint Service requirements. The objective of this XD effort is the development of an Integrated Medical System for Individual Protection which will provide the medical support needed to minimize deaths, disabilities, and patient loads, and improve survivability, patient care, combat effectiveness, and mission accomplishment on the integrated battlefield. The major objectives for FY 1984 continue to be: development of prophylaxis, pretreatment compounds, antidotes, and therapeutic drugs for prevention and treatment of the effects of US and threat CW agents; development of criteria for triaging casualties on the integrated battlefield; development of a patient decontamination technology data base; and assessment of physiological burden imposed by CW protective materiel.

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PE 63751A Medical Defense Against Chemical Warfare - This, a new start in FY 1982, represents the US Army Medical Department's current AD effort to develop and ultimately field an Integrated Medical System for Individual Protection. This system will provide maximum soldier survivability on the integrated battlefield by providing CW agent antidotes, patient decontamination capability, and the ability to effectively manage CW casualties. During FY 1984, drug development efforts would continue as well as AD of patient decontamination systems, assessment of a multiple CW casualty resuscitator/ventilator for aid station and field hospital use and vital signs monitors.

PE 63764A Medical Chemical Defense Life Support Materiel - FY 1983 is the first year of this AD effort. The funding will support establishment of an industrial base in the US for the production of pharmaceutical-grade compounds identified in ED to be effective as CW agent antidotes, prophylaxes, therapeutic and pretreatment drugs, and to support final safety, efficacy, and toxicity studies in animals. Several new compounds will be studied during FY 1984 in order to provide protection for the soldier from all the nerve, blister, and blood agents known to be in the inventory of the Warsaw Pact countries.

PE 64757A Medical Chemical Defense Life Support Materiel - FY 1984 is the first year for this full-scale ED program for medical care system support of mobile tactical field forces. It will complete fielding and logistical support requirements

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for improved medical equipment, supplies and drugs essential to counteract known threat agents. The effort will fund development of drugs and medical materiel through initial procurement; follow-on procurement will be met through other funding (Operation and Maintenance, Army - OMA - and Operations and Personnel, Army - OPA).

4. Technical Support of Agent and Munitions Development.

The programs included in this subgrouping support the DOD development of deterrent retaliatory and combat support chemical weapons.

PE 63615A Lethal Chemical Munitions Concepts - The objective of this Army program is to conduct AD on binary lethal chemical agent munitions which have advanced from XD and exhibit potential for casualty production through either the respiratory tract and/or penetration of environmental and protective clothing. Small-scale pilot units are designed and installed to obtain process engineering data for application to future production facilities. Chemical agent munition concepts that employ the binary principle are evaluated. No comparable work is done by the other services on lethal chemical agent processes. During FY 1984, AD will be continued on the Multiple Launch Rocket System (MLRS). [Deleted].

PE 64610A Lethal Chemical Munitions - The objective of this program is to conduct ED on new binary lethal chemical

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weapons and equipment for the Services. (The objectives of this program were changed in 1970 and currently support only the development of chemical munitions which produce the toxic agent via the binary mode.) The binary design would provide for maximum safety in handling, storage, transportation and demilitarization and at the same time optimize state-of-the-art advances to ensure maximum effectiveness on-target. Development of the 155mm Binary Projectile (M687), which generates the non-persistent nerve agent GB-2, was completed during FY 1977. ED on the 155mm IVA projectile and the 8-inch IVA projectile has been terminated. Funds will not be programmed in PE 64610A until the IVA warhead for MLRS transitions from AD.

PE 64604N Chemical Warfare Weapons (BIGEYE) - This program would provide for development of the BIGEYE, a direct attack binary spray bomb developed as a joint Service project with Navy as lead Service and Air Force as participating Service. Like the other binary systems, production is contingent upon Congressional funding. BIGEYE would be the first aircraft-delivered weapon to generate persistent agent (VX-2) from two nonlethal chemicals. [Deleted]. Shipboard handling and storage would be permitted with these systems whereas current chemical weapons are not normally authorized in peacetime aboard ship for safety reasons. The FY 1984 planned program would: (1) complete most technical and operational tests and

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evaluations and document the Technical Data Package for [deleted].

5. Field Test Activity.

PE 65710A Joint Chemical/Biological Point of Contact/ Test/Assessment - The objectives of this program are to plan, conduct, evaluate, and report on joint tests and/or operational research studies in response to requirements from the Unified Commanders and the Services and to serve as the DOD joint contact point for all Chemical-Biological (CB) defense test and CB technical data source books. Six tests, four studies, and one source book are planned for initiation, and/or completion in FY 1984. The tests will evaluate the effects of a toxic environment on various combat and combat support operations, the effects of agent on support equipment and alkyd-based paint, and the techniques for the rapid decontamination of interior surfaces of combat vehicles. The studies will address both offensive and defensive operations under toxic environments. Simulants will be the subject of a data source book effort.

B. Procurement.

The technical quality of much of US standardized and fielded CW warning and protective equipment represents the state of the art. [Deleted] [deleted]. Procurement programs currently proposed by DOD for [deleted] quantities of standardized equipment would provide an improved protective posture enabling deployed forces to operate in a CW environment [deleted].

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Significant increases were made to the FY 1979-83 programs to accelerate chemical protective equipment development and acquisition. There have been problems in re-establishing the production base for CW-related items. The major problem in the acquisition process is that the relatively small program quantities for certain equipment do not attract large industry interests, procurement regulations hamper rapid response, and the small manufacturers who receive contracts experience numerous problems in material supply and quality control.

The Army procurement program for the 16 divisions of its active force provided for achievement of an individual protection capability by the end of FY 1981 and will provide for replacement of equipment to be consumed by an increased annual training program and by shelf life losses in FY 1982-83. The Army is equipping its 8-division reserve components with priority to early deploying divisions. [Deleted].

The Army has planned fairly substantial purchases of non-consumable items (alarms, shelters, etc.) for its 24-division total force. Most item purchases would be completed by [deleted]. Equipment requirements for [deleted] war-reserve stocks have been identified and will be fundad concurrently with initial issue requirements.

Air Force CW defense equipment procurement now provides a [deleted] capability for forces [deleted]. Designated mobility forces including Air Force Reserves and Air National Guard have received [deleted]. Equipment includes: air crew and ground crew and special-team protective ensembles; detection and alarm devices; and decontamination equipment. [Deleted]

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[deleted].

Chemical defense equipment is provided on all Navy ships. It consists of personal protective masks, impregnated clothing, water washdown systems to flush off contaminants, decontamination stations, antidotes and chemical agent detectors. This equipment is provided during the fitting-out period as a standard part of total costs. Organizational maintenance funds are provided for subsequent repair and replacement, as required. Therefore, the Navy does not ordinarily differentiate between CW protective equipment and other items in its funding programs. Deficiencies remain in the areas of [deleted]. Actions are in progress to develop definitive plans and programs to equip Naval forces [deleted]. If shipboard evaluation is successful, the new Army/Air Force Chemical Agent Detection and Alarm Set (ionization point detector) or other candidate detector will be installed in Navy ships [deleted], as will [deleted].

Marine Corps chemical procurement parallels US Army procurement because of the two Services' common interest in ground combat requirements. Since the US Army is the executive agent for joint Services chemical development, the Marine Corps closely monitors Army RDT&E activity to ensure that specific

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Marine Corps requirements are satisfied. Recently developed/improved chemical defense equipment, e.g., detectors/alarms, protective clothing, decontamination kits, and antidotes, have been programmed or are being processed for procurement [deleted]. The Marine Corps has programmed $104 million for procurement items during FY 1984 through FY 1988. Current developmental items satisfying Marine Corps requirements would be placed into the procurement cycle as soon as available for field use.

C. Integrated Binary Munition Production Facility.

The integrated binary facility is designed to take advantage of colocated activities -- improved control and central management, reduced overhead and costs and avoidance of duplication -- and would be developed in three phases (based on agent type) at Pine Bluff Arsenal, Arkansas. The first phase will consist of those structures and equipment necessary to support binary non-persistent agent (GB-2) systems; in this case, the 155mm artillery projectile. Funds for the Phase I project were approved by Congress in 1981. It involves the establishment of a chemical plant to make the binary precursor difluoro (DF), a nonlethal, industrial-type chemical; and facilities to fill DF into special canisters and load, assemble and pack the projectile. The Phase II project would support binary persistent agent (VX-2) systems -- the BIGEYE bomb. Construction funds for this effort were included in the FY 1983 Military Construction Request. When equipped from funds to be requested in [deleted], it would provide a capability to

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load one of the commercially procured precursors into the bomb and pack out the munition in its storage configuration. The third and final phase would allow for follow-on construction for future [deleted] systems [deleted]. The present cost estimate for building the first two phases is $80 million.

D. Operation and Maintenance.

1. Demilitarization.

Three Public Laws -- 91-121, 91-441, and 91-190 -- impose stringent environmental restrictions on the transportation and disposal of chemical munitions. These restrictions plus the quantity of munitions and bulk agent to be demilitarized will entail significant expense ($3-4 billion) and time (at least 20 years). Chemical weapon arms control proposals have called for complete destruction of stockpiles within 10 years. Such a program could entail substantially greater costs.

The Defense Science Board, in its review of The Chemical Warfare Program in the summer of 1980, recognized the demilitarization program as an urgent national requirement involving significant resources irrespective of the outcome of arms control efforts. The Army is currently responsible for planning and conducting this program thru FY 1984. Future overall management and resourcing of the program is the subject of an ongoing DOD study. With or

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without a chemical weapons agreement, adequate funding and support for this national program will be required.

The current demilitarization program began in 1969 when the Army undertook re-evaluation of past disposal practices of dumping at sea. The National Academy of Sciences reviewed the problem and recommended that a systematic study of optimal disposal methods be undertaken. Three systems have been developed to demilitarize chemical munitions -- the Drill and Transfer System (DATS), the Chemical Agent Munitions Disposal System (CAMDS), and the incineration process for the destruction of Chemical Agent Identification Training Sets.

DATS is a portable system designed to handle a small number of defective munitions and leakers at storage installations. DATS does not destroy the agent or munition; it merely separates the two and both must be disposed of by other means. DATS completed pilot testing at Dugway Proving Ground, Utah, in December 1979, and its first operation was at Pine Bluff Arsenal, Arkansas, in June 1981. Since that time, DATS has also completed work at Anniston Army Depot and has begun operations at Lexington-Blue Grass Depot Activity.

CAMDS is an industrial size, prototype system designed to develop and demonstrate advanced procedures and equipment for large scale demilitarization. Processes employed by CAMDS include chemical neutralization, incineration and thermal destruction. The system will be tested during 12 phases (1981-1987), destroying

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approximately 130,000 assorted munitions. Initial tests have proven the effectiveness of the overall design, but it reflects state-of-the-art capabilities, significant capital investment and high energy consumption.

Chemical Agent Identification Training Sets located at Rocky Mountain Arsenal (RMA) are being destroyed by an incineration process.

There are presently over 750,000 toxic munitions identified for immediate demilitarization including over 615 leaking munitions which have been containerized for safety. Of immediate concern is the need to dispose of sizeable quantities of obsolete chemical agents and munitions stored at Johnston Atoll in the Pacific, incapacitating agent BZ at Pine Bluff Arsenal, M55 chemical rockets and M23 land mines. The chemical demilitarization program for FY 1984-1988 includes a facility for the demilitarization of agent BZ at Pine Bluff, Arkansas, in FY 1984, initiation of construction of the Johnston Atoll Chemical Agent Disposal System in FY 1985, and construction of facilities at various locations in CONUS to demilitarize M55 rockets and M23 mines in FY 1986.

FY 1984-1988 funds required for demilitarization are shown in Table 1:

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TABLE 1: FY 1984-1988 Demilitarization Funds ($M).

	FY84	FY85	FY86	FY87	FY88	TOTAL
OMA	54.4	94.6	146.1	129.0	119.3	543.4
MCA	10.5	43.1	35.0	-	-	88.6
R&D	11.8	8.8	7.5	1.5	0.5	30.1
Total	76.7	146.5	188.6	130.5	119.8	662.1

In order to provide the improved technology necessary to demilitarize efficiently existing stockpiles of obsolete chemical munitions and agents, and eventually the entire current chemical stockpile, the Army initiated PE 63752A, Demilitarization Concepts, in FY 1982. The primary thrust of this program will be directed toward agent destruction alternative studies to identify potential new technologies for application to chemical demilitarization process design. For FY 1984, detailed evaluation of alternative agent destruction processes will be completed. Advanced munitions processing concepts will continue. Pilot design will continue for those technologies offering the most benefit and least risk for incorporation into planned chemical demilitarization facility design. Evaluation of prototype advanced munitions processing equipment and prototype environmental monitoring systems will be continued. Pilot-scale demilitarization waste disposal demonstrations will continue.

2. Maintenance.

The US chemical munition stockpile was not improved during the 1970s. Only routine maintenance necessary for

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safety was performed. Funds were requested and provided in the FY 1979 through 1983 budgets for improving the readiness status of the existing usable munitions. Emphasis was placed on expediting maintenance on 155mm and 8-inch nerve agent artillery projectiles and nerve agent bombs. The FY 1984 budget request contains $8.4M for this continuing effort which consists primarily of derusting, assembly of projectile bursters, cleaning, repainting, and repalletizing.

Additional descriptions of the current deterrent stockpile are found in Section III E, paragraph 1 of this report.

3. Stockpile Surveillance and Security.

Management of the US chemical weapons stockpile includes an extensive and very intensive surveillance and security program. Personnel involved with storage, maintenance, inventory and security are carefully screened by a chemical surety program. The munitions are subject to vigorous inspection procedures to ensure storage safety and to monitor their condition. Further, chemical munitions and agents are stored in special facilities which are protectd by extensive security measures to include guards, backup forces, barriers and intrusion detection systems.

E. Five Year Costs.

The CW program will cost approximately $7 billion over the five year period (FY 1984-88). Chemical defense will account for approximately 78 percent of the projected FY 1984-88 costs, with the remainder allocated to modernize our deterrent

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retaliatory capabilities and begin demilitarization of obsolete existing chemical stocks. It is, of course, difficult to predict with much confidence costs beyond a few years. The estimate is that the annual costs will remain at approximately the same level.

III. STATED MILITARY REQUIREMENTS

At present [deleted]. If current offensive and defensive programs are funded as planned, [deleted]. US capabilities and commitments are presented in detail below.

A. US CW Objective.

The objective of the US CW program is to improve defensive and deterrent retaliatory capabilities against the use of chemical weapons while working to achieve a complete and verifiable ban on their development, production, and stockpiling. As part of a credible and effective deterrent, the US seeks to achieve an adequate CW warning and protective capability and the ability and means to retaliate with chemical weapons in such a manner as to neutralize the advantages gained by enemy use of CW and to seek termination of the use of chemical weapons at the lowest level possible.

Recent DOD assessments, as well as those of past years, have found [deleted] in the US CW posture, compared with the Soviets. Continued Soviet emphasis on CW [deleted], and by the use of toxins and other chemical weapons in Southeast Asia and Afghanistan.

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B. Soviet and Warsaw Pact CW Capabilities.

A large asymmetry exists between the US and USSR in chemical weapon capabilities. Soviet military doctrine provides for the use of chemical weapons. Of more significance, Soviet forces are the best prepared and equipped in the world to operate in a CW environment produced either by an enemy or themselves. The Soviets have operational chemical weapon stocks, [deleted]. They also have a wide range of weapon systems capable of delivering chemical agents. The Soviets have devoted more resources than the US to Nuclear/Biological/Chemical (NBC) defense/protection, reflecting concern for the ability of their forces to operate in a CW environment. For example, new equipment fielded by Soviet forces (new armored personnel carriers, tanks, reconnaissance vehicles, some trucks, and various types of support equipment) is provided with modern filtration and protective systems. Some of the non-Soviet Warsaw Pact (WP) forces have produced and acquired similar equipment. NBC training for WP forces is extensive and frequent. [Deleted]. These measures enable these forces to operate in a CW environment more effectively than US/NATO forces.

Based on the analysis of all available evidence, [deleted] the Soviet Union will continue to maintain or improve its NBC capabilities into the foreseeable future. Since 1976, there have been numerous reports of toxin and other CW use in Southeast Asia. These include information on Soviet-sponsored use of trichothecene toxins and other lethal and incapacitating chemical agents in Laos and Kampuchea in which as many as several thousand people have died. The Soviet technical advice and support role in Southeast Asia is increasingly evident. Analysis of data from Afghanistan indicates use of riot-control agents, incapacitants, lethal

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agents, and toxins by Soviet forces. As for the Soviet connection in Southeast Asia, the conclusion is inescapable that the toxins and other chemical warfare agents were developed in the Soviet Union, provided to the Lao and Vietnamese either directly or through the transfer of know-how, and weaponized with Soviet assistance in Laos, Vietnam, and Kampuchea. Although these conflicts present

situations different from what could be expected in a war in Europe, the available evidence demonstrates that chemical warfare remains an intrinsic part of Soviet military strategy.

C. Impact of CW Use on US Forces.

[Deleted].

The effect would be doubly severe, if NATO forces alone were subject to this attack without the enemy being equally impeded by chemical attack on his first and second echelons

and supporting force structure. The need to deter the use of chemical warfare in any conflict is critical.

D. CW Protective Program.

CW protective capabilities are necessary to ensure that conventional and theater nuclear forces can survive and operate in a chemical environment. The existence of a credible Soviet CW program dictates that the present US RDT&E protective program be continued to allow for the development of an effective protective posture. A protective capability also requires highly trained, properly equipped and motivated forces.

The allies have committed themselves to improving their protective capabilities under the Long-Term Defense Plan. [Deleted].

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E. Chemical Retaliation.

A chemical retaliation capability is viewed by the Administration as the most credible and effective specific deterrent presently obtainable against Soviet use of chemical weapons. Chemical weapons used in a retaliatory role are an effective nonnuclear counteraction that could offset most of the advantages an enemy might expect to gain by CW offensive actions and places his forces in a degraded posture as well. Defense/protective measures alone cannot constitute a credible deterrent [deleted]. A threatened retaliatory use of chemical weapons would be more credible and less escalatory than a threat to use nuclear weapons, as well as providing sufficient time for political and diplomatic efforts to terminate the conflict prior to crossing the nuclear threshold. The need to deter is especially critical since civilian populations have virtually no protection.

1. Present US CW Retaliatory Capabilities.

There has been an increasing disparity between our CW policy and our military capability. The policy requires that US forces possess a credible and effective CW retaliatory capability for deterrence and if deterrence fails. [Deleted].

As previously reported, current US inventories of bulk chemical agents total about [deleted]. Ready-to-issue and repairable lethal chemical munitions* [deleted]

* Repairable munitions are unserviceable munitions which can be brought to serviceable condition by various maintenance operations such as replacing unserviceable explosive components, inserting explosive components, derusting, remarking of containers repackaging, etc. During the conduct of these operations, which includes an inspection of each round, some munitions will be found to be unrepairable. "Ready-for-issue" munitions are those in serviceable condition with all explosive components (bursters and supplementary charges) uploaded.

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[deleted].

The current maintenance plan primarily places emphasis on [deleted].

A stockpile surveillance program has been underway since 1977, and it indicates that the stockpile is deteriorating in terms of agent purity. Because the deterioration is both internal to the munitions and self-catalyzing, it will occur at an increasing rate regardless of maintenance efforts which address only the munition exterior. Less well-known, but potentially more serious, is the effect of degradation by-products on munition metal parts which could affect munition safety. Although the purity of agent in the usable munitions in the stockpile is still within acceptable limits, it has degraded and will continue to do so at an increasing rate irrespective of maintenance programs. The continued firing safety of unitary artillery shells thus becomes increasingly open to question.

As weapon systems are phased out, or become obsolete as a result of changes in tactics and doctrine, munitions for these systems (i.e., the 4.2-inch mortar, 105mm howitzer, TMU-28/B and Aero 14B spray tanks, and M23 VX land mine) have been or will be

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placed in a category awaiting demilitarization. There are about [deleted] in serviceable but not useful munitions in this category. Thus, for these reasons, by the [deleted] of the present [deleted] will remain in ready for issue and repairable lethal chemical munitions. The remainder of the stockpile will have become unusable from an operational point of view. Whether or not any deliverable US munitions in the current stockpile will be usable or useful for deterrence/retaliatory purposes beyond the early 1990s is highly uncertain.

2. Stockpile Improvements.

Although funds have been provided for the construction and equipping of the Phase I binary chemical munitions facility, and the Administration has requested funds for production, Congress has not granted authority to produce binary chemical munitions.

The objective for the retaliatory element of the program is to maintain the safest, smallest chemical munitions stockpile that provides the ability to deny a significant military advantage to any initiator of CW. The US does not plan to match the Soviets in agent/munition quantities of any type, and will continue to exercise restraint. It will make only those improvements necessary to ensure that the US has a credible and effective deterrent retaliatory capability.

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IV. FUNDING* ("then year" in millions)**

	FY 82	FY 83	FY 84	FY 85 (est.)	FY 86 to Completion	Total Dev.	Total Proc.	Total Units	Unit Cost	TOTAL Program Cost
Development										
Technical Base										
62622A552 Cml Mun	13.7	7.7	9.1	11.2	Cont	NA	NA	NA	NA	NA
62706A CB Def & Gen Invest	26.9	28.5	34.8	37.5	Cont	NA	NA	NA	NA	NA
62764N CBR Def Tech	0.9	0.9	3.4	3.5	Cont	NA	NA	NA	NA	NA
SUBTOTAL	41.5	37.1	47.3	52.2						
Defense Materiel										
63720A C/B Det, Warn, Samp Mat Concepts	12.6	7.9	20.9	40.0	Cont	NA	NA	NA	NA	NA
63721A CB Prot Mat Concepts	11.2	8.6	3.1	9.0	Cont	NA	NA	NA	NA	NA
63745F CW Def	4.0	4.9	4.6	4.4	Cont	NA	NA	NA	NA	NA
64724A C/B Det, Ident, Warn and Samp Mat	14.1	6.2	8.7	12.6	Cont	NA	NA	NA	NA	NA
64725A CB Prot Mat	22.8	19.1	19.7	12.8	Cont	NA	NA	NA	NA	NA
64506N BW/CW Countermeasures	7.7	8.4	8.4	7.7	Cont	NA	NA	NA	NA	NA
64601F C/B Def Equip	9.8	16.3	15.5	14.3	Cont	NA	NA	NA	NA	NA
SUBTOTAL	82.2	71.4	80.9	100.8						
Medical Research										
62734A Med Def against Cml Agts	24.1	26.2	30.6	33.4	Cont	NA	NA	NA	NA	NA
63751A Med Def against Cml Warfare	2.6	2.9	47.7	50.7	Cont	NA	NA	NA	NA	NA
63764A Med Cml Def Life Spt Mat	-	34.6	38.9	34.5	Cont	NA	NA	NA	NA	NA
64757A Med Cml Def Life Spt Mat	-	-	4.8	21.4	Cont	NA	NA	NA	NA	NA
SUBTOTAL	26.7	63.7	122.0	140.0						
Agent and Munitions Develop										
63615A Lethal Cml Mun Concepts	10.1	-	15.5	17.4	Cont	NA	NA	NA	NA	NA
64610A Lethal Cml Mun	-	-	-	-	Cont	NA	NA	NA	NA	NA
64604N CW Weapons	9.2	0.8	3.4	0.9	Cont	NA	NA	NA	NA	NA
SUBTOTAL	19.3	8.0	18.9	18.3						
Field Test Activities										
65710A Joint Test	1.3	1.4	1.0	2.4	Cont	NA	NA	NA	NA	NA
Demilitarization										
63752A Demil Concepts	8.5	12.7	11.3	8.5	Cont	NA	NA	NA	NA	NA
Total Development	179.5	194.3	290.2	330.2						
Procurement - Chemical Defense***	302.8	260.7	332.8	432.9	Cont	NA	NA	NA	NA	NA
Procurement - Chemical Retaliatory Capabilities (Munitions)	-	-	61.0	251.5						
Procurement - Chemical Retaliatory Capabilities (Facilities)	-	24.1	96.5	10.1	Cont	NA	NA	NA	NA	NA
Stockpile Maintenance	5.3	19.5	6.5	2.2	Cont	NA	NA	NA	NA	NA

* Includes only CW funding wherever programs include BW or other activities.
** Department of Defense.
*** Includes operation and maintenance, military construction, and war reserve.

V. ANALYSIS

The proposed FY 1984 CW Program (i.e., active RDT&E of both deterrent retaliatory and defensive CW needs, procurement of an improved protective CW capability, initiation of the modernization of the US deterrent retaliatory capability, development of the capability to dispose of the deteriorating chemical agent stockpile, and maintenance of currently stockpiled chemical munitions) provides the basis for this analysis.

A. <u>Consistency with US Arms Control Policy and Related Presidential Decisions</u>.

The US CW program is consistent with US arms control policy. The US is committed to the eventual objective of concluding a complete and verifiable prohibition of chemical weapons production, development, and stockpiling. However, in the absence of satisfactory international agreements to eliminate the threat of CW, there is an urgent need to improve US CW defense and deterrent retaliatory capabilities. Administration actions to modernize the US CW capability do not represent a decision to place greater reliance upon chemical weapons, but reflect overall US national security policy to deter war. They represent a necessary step to increase the effectiveness of the US policy of maintaining a credible and effective deterrent retaliatory capability, which in turn enables the US to gain crucial negotiating leverage in the area of chemical weapons arms control. These actions are fully consistent with, and complementary to, the US

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policy of no first use of chemical weapons and pursuit of an eventual comprehensive and verifiable ban on chemical weapons.

B. Relation to Arms Control Agreements.

The US is not constrained by international law nor party to any treaty or other legal obligation that would inhibit the development, production, stockpiling or deployment of chemical weapons.

The Geneva Protocol of 1925, to which the United States acceded in 1975, in effect, prohibits the first use in war of asphyxiating, poisonous, or other gases, and of bacteriological methods of warfare,* because some signatories, including the US and USSR, reserved the right to retaliate in kind after first use by another signatory. The Protocol does not prohibit development, production or stockpiling of chemical weapons.

The Biological Weapons Convention (BWC), to which the United States became a party in 1975, prohibits the development, production, stockpiling and transfer of biological and toxin weapons. All such materiel was to be destroyed within nine months of the Convention's entry into force in 1975. While the BWC does

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* The United States has consistently interpreted the Geneva Protocol as applying to lethal or incapacitating chemical agents, and not to riot control agents. The majority of states party to the Protocol make no such distinction, and consider the first use of riot control agents in war to be covered by the prohibition in the Geneva Protocol. In seeking Senate advice and consent to ratification of the Protocol, the President declared that, as a matter of policy, the US would not be the first to use riot control agents in war, except in defensive modes to save lives, subject to Presidential approval.

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not contain specific verification provisions, the use of toxins and other chemical agents in Laos and Kampuchea and the use of toxins and a variety of lethal CW agents in Afghanistan, as well as the unwillingness of the Soviet Union to discuss US concerns about Soviet compliance with the BWC and the Geneva Protocol of 1925, have underscored the importance of effective verification and compliance mechanisms in any future chemical weapons agreement. The BWC does not prohibit the development, production or stockpiling of chemical weapons but does obligate its parties to continue negotiations towards a prohibition of chemical weapons.

The US maintains a chemical weapons capability for deterrence and for retaliatory purposes only. The conduct of research in retaliatory-related CW areas and the modernization of the deterrent retaliatory stockpile provides a base for re-establishing the credibility and effectiveness of the US CW deterrent retaliatory capability. In addition, this retaliatory-related CW research also provides a base for the prevention of technological surprise, allows evaluation of the vulnerability of US forces and equipment, and improves the chemical weapons arms control negotiating position of the United States.

Efforts to improve CW protection capabilities are not constrained by any treaty or other legal obligation.

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C. Effect on Current and Prospective Negotiations.

The proposed FY 1984 US CW program described in Section II of this ACIS is consistent with US participation in efforts to attain a complete and verifiable chemical weapons agreement.

The US supports the eventual objective of concluding a complete and verifiable prohibition on the production, stockpiling, acquisition or retention of CW agents and munitions. Development of CW agents or munitions would be prohibited, but development of means of protection against chemical attack would be permitted. Existing stocks of CW agents and munitions would be destroyed over a period of ten years. All facilities designed or used for production of prohibited agents and munitions would be declared and immediately closed down and subsequently destroyed. However, under appropriate controls such a facility could be used for agent/munition destruction operations. The disposition of declared facilities and the destruction of declared stocks would require on-site verification under independent, international auspices. Although full implementation of such a ban could take at least ten years after coming into force (time required for destruction of stocks), in the long term an adequately verifiable chemical weapons agreement might eliminate the significant risk to US/NATO forces posed by Soviet CW capabilities and prevent further proliferation of chemical weapons.

Our allies support efforts toward attainment of a complete and verifiable chemical weapons agreement.

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After a year of technical consultations (1976), bilateral US-USSR negotiations on a comprehensive chemical weapons prohibition began in 1977. However, in 1979, the negotiations stalled due principally to fundamental disagreement on critical issues relating to the effective verification of a chemical weapons ban and particularly Soviet intransigence relating to on-site inspections. No bilateral negotiations have been held since 1980.

After a comprehensive review of interagency recommendations on United States chemical weapons arms control, the President in January 1982 approved a policy [deleted]. The US Ambassador informed the CD in March 1982 that the possibility of resuming bilateral negotiations remains open, pending a demonstration by the Soviet Union of genuine readiness to negotiate effective verification and compliance arrangements, and to comply with their obligations under existing agreements.

In multilateral fora, discussions on a chemical weapons agreement have been underway since the late 1960s. With the beginning of US-USSR negotiations, multilateral activity waned to some extent, although interest in a chemical weapons prohibition on the part of our allies and others continued.

Over the last three years, multilateral interest in chemical weapons discussions has intensified. During its spring 1980 session, the CD established an ad hoc working group to

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identify the issues to be dealt with in the negotiation of an eventual chemical weapons prohibition and to obtain states' views on these issues; it did not engage in negotiation of treaty language. The Working Group was re-established for the 1981 and 1982 sessions. The US has played a key role in this group and its deliberations to ensure that the CD's work would help build support for a sound approach to a chemical weapons ban. In January 1982, the President also approved a policy which reaffirmed US support for CW arms control discussions in the CD. The United States joined a consensus by which the Working Group's mandate was changed to permit the CD to begin the multilateral elaboration of a chemical weapons convention, with a focus on the development of measures to assure effective verification and compliance.

The US has participated actively in the CD Working Group in a way designed to bring pressure to baar on the Soviet position, particularly on verification. [Deleted]. It is the Soviets who are -- and are parceived to be -- holding to an unreasonable and unforthcoming position.

The Soviet Union presented an updated statement of their views on the "Basic Provisions" of a chemical weapons convention in June 1982, during the United Nations' Second Special Session on

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Disarmament (SSOD II) in New York. Their document, while vaguely worded, generated widespread interest in the possibility that there had at last been some Soviet movement on key verification and compliance issues. Efforts to explore this possibility became a major focal point for the Summer (July-September) 1982 session of the CD. However, the Soviets once again avoided dealing with the key issues and attempted to divert attention to less important matters. Despite concerted probing of the Soviet position by the US delegation and others, [deleted], the Soviets would not clarify their views on issues or expand upon the "Basic Provisions" document they submitted to the SSOD II. While professing flexibility and willingness to negotiate, the Soviets have failed, to date, to show that they are truly prepared at this point to cooperate in finding mutually acceptable solutions to the key issues.

[Deleted].

[Deleted].

[Deleted].

The Administration supports and has directed US representatives to participate actively in the CD's current efforts to elaborate a CW convention with a focus on developing measures to assure effective verification and compliance. This strategy [deleted] emphasizes the necessity for concluding the most effective verification arrangements. It thus is designed to maintain widespread international, [deleted], pressure on the Soviets to deal seriously with outstanding verification and compliance issues -- questions which must be resolved satisfactorily if an effective CW prohibition is to be concluded.

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The Soviet Union has sought to gain propaganda advantage from US efforts to improve its capabilities. They have blamed the past lack of bilateral negotiating progress on the United States and are in the process, it appears, of altering their public position on a chemical weapons prohibition just enough to create an image of being forthcoming, but not enough to truly resolve the issues, in an effort to stimulate domestic and international pressure on the US to delay its improvement programs further. [Deleted]. However, we have been [deleted] promoting broader understanding of the necessity and utility of US chemical weapons modernization plans by exposing Soviet CW activities in this field and by raising questions about Soviet motives in refusing to accept effective verification arrangements for a chemical weapons prohibition.

A US decision [deleted]
[deleted].

However, [deleted]. Drawing back now may have conveyed indecisiveness and a lack of resolve to the Soviets and enabled them to believe that they have accomplished their goal without negotiation, making it even more difficult, if not impossible, to achieve our arms control objective.

D. Effect on Global and Regional Stability.

The United States believes that its CW capabilities play an important role in deterrence and defense. NATO's strategy of flexible response requires a variety of options in support of military and diplomatic efforts to bring a conflict to early termination on terms acceptable to the United States and its allies. Continued retaliatory RDT&E efforts and continued actions to improve the US deterrent retaliatory capability, to procure an improved protective capability and to gain leverage in arms

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control negotiations, should contribute to stability. Continued reliance on the existing deficient stockpile, however, could encourage instability [deleted].

[Deleted].

[Deleted].

E. Technological Implications.

A wide spectrum of technological improvements with potential military significance could occur during the next ten years. Chemical agents might be developed which [deleted]. New antidotes, medications, protective equipment, and warning or detection devices also can be expected. However, from a US standpoint, no technological development is envisioned that is likely to provide relief from the operational degradation problems created by the protective posture requirements of CW. Future technological developments cannot be expected to produce major changes in the utility of chemical weapons or detract from the possible advantages accruing to an initiator of CW.

F. Potential Interaction with Other Programs.

Chemical weapons are important to deterrence [deleted]. In the current environment of [deleted].

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[Deleted].

G. Verification.

Arms control agreements cannot be based simply on trust, particularly with a highly secretive adversary like the Soviet Union. There must be effective means of verification that enable the US to know with confidence whether the terms of agreements are being honored. In practice, this means the US must be able to monitor activities in the areas covered by these treaties in order to detect any violations at a very early stage. Arms control agreements that cannot be effectively verified cannot enhance security at lower levels of armaments and therefore, are not acceptable.

In the past, the US relied primarily on national technical means (NTM) of verification, operated unilaterally by the US. As arms control agreements, the systems they cover, and the possibilities of concealment become more complex, it may be necessary to supplement NTM with some form of "cooperative" measures of verification. The Reagan Administration has made it clear that the US will insist on verification procedures to ensure full compliance with the provisions of any agreement, including measures beyond national technical means, as necessary, to achieve US objectives. Likewise, Congress has expressed their concern for effective verification measures in any treaty to which the United States may become a party.

The Soviet Union can verify easily that the US is actually conducting the CW program which we openly claim, i.e., active RDT&E of both retaliatory and defensive CW needs, initial construction of a binary production facility, and procurement of an improved protective CW capability. [Deleted].

[Deleted]

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[deleted].

For the above reasons, [deleted].

Efforts underway [deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

Elimination of the use of chemical weapons is a national security objective of the United States. The ongoing use of mycotoxins and other chemical weapons in SEA and Afghanistan underscores its importance. US policies to achieve this objective have two interrelated and complementary aspects. The first deals with chemical weapons arms control and disarmament, the second with military strategies and capabilities to deter and, if necessary, defend against chemical warfare. Essentially, chemical weapons arms control is to be pursued, and appropriate military capabilities are to be maintained, until such time as verifiable international agreements can be concluded which effectively remove existing and future threats of chemical warfare.

Given the many technical, as well as political, difficulties which remain to be resolved, conclusion of an effective chemical weapons prohibition is not a real possibility for the foreseeable future. Active RDT&E of both deterrent retaliatory and defensive CW needs, procurement of an improved CW protective capability and the initiation of the modernization of the deteriorating chemical retaliatory capability are necessary for our defense so as to deter Soviet use of CW against us or our allies. They are consistent with US arms control policy and, by helping to eliminate the existing large asymmetry in US-USSR CW capabilities, will give the US the vital negotiating leverage that is absolutely essential if the Soviet Union is to be convinced that it is in its interests [deleted].

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DIRECTED ENERGY PROGRAMS

I. INTRODUCTION

This arms control impact statement addresses the following Department of Defense (DOD) and the Department of Energy (DOE) programs:

PE Number	Program Title
63605F	Advanced Radiation Technology
62601F	Advanced Weapons: Laser Applications, Advanced Weapon Concepts
63603F	Space Laser Program
62735N	High Energy Laser Technology
62768N	Directed Energy Technology
62307A	Laser Weapon Technology
63314A	High Energy Laser Components
62711E	Experimental Evaluation of Major Innovative Technologies: Projects EE-7, EE-8, and EE-12
62301E	Strategic Technology: HEL Technology
62707E	Particle Beam Technology
DOE	Classified Program

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The above programs represent an effort to explore the technologies and to develop the potential of directed energy (DE) weapons.

Extensive studies have shown that, if actually developed, DE weapons would have potential mission advantages over many existing types of weapons against missiles, aircraft and spacecraft targets. Such advantages flow mainly from the extremely high delivery speed of the damaging energy to the targets. This permits little opportunity for evasive maneuver by the target and could allow the use of multishot and rapid retargeting capabilities against saturation attacks.

While high energy lasers and particle beams differ in state of development and in technology required to realize them, they have potential for weapon systems of similar operational characteristics. Moreover, if they can be developed as weapons, they could have similar implications for the future of the Anti-Ballistic Missile (ABM) Treaty, possible antisatellite (ASAT) negotiations, and space defense issues generally.

II. PROGRAM DESCRIPTIONS

A. The DOD High Energy Laser Program.

The DOD high energy laser (HEL) program is an integrated effort of the Services and the Defense Advanced Research Projects Agency (DARPA). Its purpose is to continue developing the technology for laser devices (beam generators), pointing and tracking (beam control) and fire control systems, and to demonstrate the

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feasibility and potential of high energy lasers as weapons. The program is structured to demonstrate, by the mid-1980s, whether work on advanced development prototypes should begin. If such protoypes are demonstrated as feasible by the early 1990s, laser weapons could be available in the late 1990s for some of the many offensive and defensive applications proposed for them such as defense of ships, aircraft, high value ground targets or satellites, destruction of ground and airborne sensor systems, and ballistic missile defense. The following paragraphs (B. through K.) discuss the programs of the individual Services and DARPA.

B. Program Element #63605F - Advanced Radiation Technology.

1. Capabilities. The goals for the Air Force program are to demonstrate the lethality of laser weapons using an airborne test bed, expend the general technology base and provide scalable technology to support decisions to begin prototype development. Potential missions of interest are large aircraft defense (e.g., bombers and cruise missile carriers), air superiority and ASAT. Recently, emphasis has been placed on the early demonstration of [deleted]. Major ongoing efforts include:

a. Airborne Laser Laboratory (ALL). The ALL, a specially equipped transport aircraft (NKC-135), has been designed to carry HEL equipment and to demonstrate laser lethality from an airborne platform. The design includes a nominal [deleted] gas dynamic laser operating at

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10.6 microns wavelength. This test bed is designed to be used in experiments against representative missile and drone targets [deleted].

b. Airborne Laser Technology Program.

This program concentrates on the critical technology necessary for intermediate-range [deleted] applications, including aircraft defense at long ranges [deleted]. Included are the development of: 1) a [deleted] cylindrical deuterium fluoride chemical laser device which is potentially scalable to an output of [deleted]; 2) short wavelength oxygen-iodine chemical laser technology; and 3) beam control system technology capable of precision on the order of [deleted].* Studies of such long-range applications as [deleted] would be conducted.

c. Mid-Range Applied Technology.

The objective of this program is to demonstrate the feasibility of [deleted] applications. The program would include advanced beam control technology development and an integrated laser technology demonstration. The demonstration is planned for the TRW Corporation facility in San Juan Capistrano, CA. The equipment used would include the

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* A microradian is an angular measure which spans one centimeter at ten kilometers distance. It is approximately one-fifth of an arc second.

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FIREPOND telescope (from MIT Lincoln Laboratories) mated with TRW's Navy-ARPA Chemical Laser (NACL).

d. Advanced Development/Support.

Development of advanced concepts in adaptive optics, laser devices, beam control, and optical components would be pursued under this effort.

2. Program Status. The status of the above programs is as follows:

a. Airborne Laser Laboratory.

Airborne lethality tests against single missile and drone targets will be [deleted] following refurbishment and upgrade of the beam control system during FY 1982. [Deleted].

b. Airborne Laser Tehnology.

Development of deuterium fluoride and oxygen-iodine chemical laser technology, advanced optical resonator and beam control technology, and fire control technology would continue in conjunction with application studies. [Deleted] testing of the [deleted] cylindrical deuterium fluoride laser would be [deleted]. Also, investigation would continue on the feasibility of using shorter wavelength laser systems for airborne missions.

c. Mid-Range Applied Technology.

[Deleted]

[deleted].

d. Advanced Development/Support.

The development and expansion of the technology base for high energy lasers is being pursued with increasing emphasis on the development of shorter wavelength devices, advanced mirror technology and advanced beam control technology.

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C. Program Element #62601F - Advanced Weapons: Laser Applications.

1. Capabilities. This program explores the technical feasibility and operational practicality of lasers as weapons to fulfill specific Air Force mission requirements. Studies are performed to include advanced laser device concepts, advanced adaptive optics, investigation of high energy laser effects, and studies and analysis of potential applications of high energy laser systems.

2. Program Status. For FY 1984, the emphasis would continue to be on short wavelength systems and on long-range (greater than 500 km) applications. Laser system demonstrations in the visible/near infrared frequency range would be made and development of optical components and [deleted] beam control concepts would continue, with demonstrations as subsystem technology becomes available.

D. Program Element #63603F - Space Laser Technology*

1. Capabilities. The Air Force Space Laser Program, begun in FY 1983, is designed to provide the basis for an informed decision by 1988 on the future development of space laser weaponry. The program will point toward system definition of a first generation space laser weapon system. General program objectives will be to:

a. [Deleted].

b. Develop detailed concept definitions for the more promising laser weapon options. Investigate technological and operational aspects [deleted].

c. Establish realistic bounds on space-based laser weapon lethality in various possible applications.

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* Because of FY 1983 Congressional actions (this PE was killed by the Defense Authorization bill), the program is being restructured.

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d. [Deleted].

e. Reduce uncertainties in basic laser system technology, [deleted], and cost and schedule estimates.

f. [Deleted].

[Deleted].

2. Program Status. For FY 1984, the Air Force would continue the analyses necessary to define the best system alternatives and would conduct damage and vulnerability tests. More specifically:

a. Project 2848 plans are to complete the definition of the most promising space-based laser weapon system concept. Supporting analyses would determine which missions are most appropriate (ballistic missile defense, air defense, satellite defense, antisatellite operations, interdiction of airborne targets, and/or precision strikes against ground targets), would perform cost-effectiveness comparisons of promising laser weapon alternatives, and would determine how to cope with active and passive countermeasures.*

b. [Deleted].

E. Program Element #62735N - High Energy Laser Technology.

1. Capabilities. The objective of this program -- named SEA LITE -- is to demonstrate the utility of HEL in potential naval applications such as antiship missile defense (ASMD) and in other applications [deleted]. This would be achieved by developing and integrating the components of a weapon performance level experimental HEL system to demonstrate that the subsystems work effectively together and that the system is lethal against realistic targets. This experimental HEL system would be assembled

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* [Deleted].

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at White Sands Missile Range where lethality tests will be conducted using targets and scenarios that are representative of the antiship missile threat. [Deleted].

2. Program Status. The laser factory acceptance testing was completed in FY 1981. During FY 1982, performance characterization tests were conducted. [Deleted].

F. Program Element #62768N - Directed Energy Technology.

1. Capabilities. This program supports research on advanced directed energy technologies and on system concepts for a variety of military applications.

2. Program Status. For FY 1984, this program would support research in pulsed chemical lasers, charged particle beams, high power microwaves, and pulsed power technology. [Deleted]. Also, research would be conducted on the key components of directed energy technologies, [deleted].

G. Program Element #62307A - Laser Weapon Technology.

1. Capabilities. This program explores potential HEL uses in weapon systems for a variety of Army mission applications, and advances the HEL technology base. Potential applications being pursued are [deleted] [deleted]. The technology base advancement entails research in laser science and quantum physics.

2. Program Status. In FY 1984, laser development would continue with emphasis on reliability and logistics design considerations. The laser effects and vulnerability data bases would be expanded and target acquisition and fire control programs would be accelerated.

H. Program Element #63314A - High Energy Laser Components.

1. Capabilities. The US Army completed a laser weapon technology assessment in FY 1980. This study concluded that [deleted].

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[Deleted].

2. Program Status. [Deleted].

I. Program Element #62711E - Experimental Evaluation of Major Innovative Technologies: Projects EE-7, EE-8, and EE-12.

1. Capabilities. The listed projects are components of a "Triad" technology demonstration program and are to demonstrate key elements of technology for a space-based laser weapon system. (The other technologies associated with these advanced concepts are being developed separately in the other DARPA HEL project, Project #62301E/ST-3 - High Energy Laser Technology.) Current planning calls for development of large space optics and beam control systems coupled with ground-based technology demonstrations of a chemical laser and a space flight experiment of precision acquisition tracking and pointing space hardware. These developments could lead to [deleted]. Components of the system include:

a. Chemical Laser Project (ALPHA, Project EE-8).

The goal of this project, to be achieved by the end of [deleted], is to demonstrate the feasibility of a [deleted], laser which could operate in space. This would be accomplished by testing in a ground-based facility a
[deleted] laser [deleted].

b. Large Optics Demonstration Experiment (LODE), Project EE-12).

The goal of this project is to demonstrate a beam control optics system which could operate in space in conjunction with a large aperture lightweight laser mirror. Specifically, the ability to manufacture a high-quality large-aperture [deleted] mirror would be shown and a beam control system would be designed for pointing stability in a simulated operational environment. [Deleted].

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c. Acquisition, Tracking and Pointing Experiment (TALON GOLD, Project EE-7).

The objective of this program is to develop and test [deleted], the capabilities for long-range [deleted] acquisition, target tracking, and precision pointing [deleted] which are critical to the feasibility of space laser weapons. [Deleted].

2. Program Status. For FY 1984, the planned activities for each of the projects is as follows:

a. [Deleted]

[deleted].

b. [Deleted].

c. [Deleted].

J. Program Element #62301E - Strategic Technology/Project ST-3, HEL Technology.

1. Capabilities. The objectives of this program are to develop the basic technologies for improving laser device efficiency, as well as to support advances in laser optical components and ultra-precise beam pointing. The laser device technology efforts are concentrated in two areas: high efficiency chemical lasers and short wavelength visible and ultraviolet lasers. The former offers attractive options for near-term applications of space-based laser weapons for satellite defense, strategic aircraft defense and limited ballistic missile defense (BMD); the short wavelengths technology offers potentially high payoff alternatives for ground-based laser ASAT in the near term and for longer range BMD in the long term.

This program also provides the supporting technology for the Triad demonstration experiments described above.

Projects within the HEL Technology program are: high power visible lasers; acquisition, tracking and pointing; and laser optics.

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2. Program status. For FY 1984, the planned activities for each of the projects is as follows:

a. [Deleted].

Free electron lasers are potentially scalable to multi-megawatt average power levels at electrical efficiencies exceeding 20 percent. These lasers are also potentially tunable throughout the infrared, visible and ultraviolet regions of the spectrum. In FY 1984 the DARPA free electron laser program would demonstrate high efficiency operation in an oscillator configuration by recovery of the unused energy in the spent electron beam after passage through the oscillator optical cavity. Experiments to demonstrate scaling of radio-frequency linear accelerators to high average power and laser operation at visible wavelengths would be initiated. Advanced beam control technology [deleted] would be verified in laboratory experiments. [Deleted].

b. Acquisition, Tracking and Pointing. Simulator tests of acquisition and tracking subsystems would be performed, including the surveillance interface. Tests of an improved pointer with rapid retargeting capability will also be conducted.

c. Laser Optics. Technology developments would be continued on large spaced-based mirrors and on adaptive beam control concepts. Specifically, in FY 1984, [deleted]. [Deleted].

K. [Deleted].

1. [Deleted].

2. [Deleted].

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L. The DOD Particle Beam (PB) Program.

Weapons based on particle beams of high currents and high energies could, if feasibility is demonstrated, serve as a possible alternative or supplement to other weapon systems. Also, particle beams will continue to have many nonweapon applications (e.g., radiography and fusion research) and can be used in research on nuclear weapons effects.

Depending on the applications intended, there are various functions which must be performed by each component of any given PB weapon system, and each of these functions represents technology which is pushing the current state of the art. Typically, these functions (components or problem areas) include: 1) primary power systems; 2) short-term energy storage; 3) accelerator injectors (or sources of particles); 4) pulse forming networks; 5) pulse power switches; 6) materials (primarily insulators and magnetic materials); 7) accelerator beam dynamics internal to the accelerator structure (including accelerating systems, such as induction and radio frequency accelerator systems); 8) beam conditioning and aiming; 9) propagating beam dynamics external to the accelerator structure; 10) beam-target interaction; and 11) propagating-beam sensing. For several of these areas -- particularly external propagation, beam conditioning and beam dynamics -- there are critical questions regarding scientific feasibility.

In FY 1978, the DOD sponsored a study to review particle beam technology and to develop a program to determine its technical

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feasibility for possible military applications. The study group recommended several options for resolving the uncertainties associated with the relevant technology areas discussed above. Some of the recommendations have been accepted [deleted].

The possible applications for PB weapons include: ballistic missile defense in the form of surface-to-air and space-based directed beams; space-based antisatellite weapons; and ship-based antiship missile defense weapons. The following paragraphs (Sections M and N) discuss the more significant research efforts underway to accomplish those missions.

M. Program Element #62707E - Particle Beam Technology.

1. Capabilities. The principal effort in PB weapon research is the DARPA funded program, which is designed to demonstrate the feasibility of propagating an electron beam through the atmosphere to distances of military interest [deleted]. Although no explicit weapon application is being addressed, success could, for example, lead to a capability for close-in, point defense of surface ships against nonnuclear and possibly nuclear antiship cruise missiles or point defense of hardened sites.

Another particle beam effort under this program was transferred from Army to DARPA sponsorship for FY 1981 and following years. The purpose of this research is to perform the

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scientific feasibility experiments which are essential in order to evaluate space-based neutral particle beam weapon concepts for ASAT and BMD missions.

2. Program Status. For FY 1984, the major technical effort would be [deleted].

Another important effort under this program is called pulsed power technology. This technology is critical for charged PB weapons and may be critical for certain laser weapon devices. Pulsed power technology involves a source of electrical energy, a storage mechanism, a means for switching the energy to a load, and some means of shaping and conditioning the pulse. [Deleted].

Feasibility experiments [deleted].

N. Program Element #62601F - Advanced Weapons: Advanced Weapon Concepts.

1. Capabilities. A separate project in this program element addresses particle beam technology. Emphasis is on pointing, tracking and lethality studies for space applications. The feasibility of atmospheric particle beam propagation will be explored through use of a moderate voltage, high current mode accelerator.

2. Program Status. [Deleted].

III. STATED MILITARY REQUIREMENTS

Directed energy weapons could provide US military forces with improved means of air defense, particularly against saturation attacks by aircraft or missiles. The ability of lasers

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to damage electro-optical pointing and tracking devices also could aid our ground forces in countering precision-guided munitions. An ASAT system based on DE could deny the Soviets the use of critical military satellites and might deter attacks against US satellites by providing a capability to destroy threatening satellites. Ultimately, pursuit of DE technology offers the possibility of providing the US a space-based option for BMD and strategic aircraft defense, although these applications look more difficult than any of the other potential missions. In sum, the potential of the directed energy weapon offers a possible new counter to increasingly capable ground, air and space-borne military threats.

The Soviets are clearly interested in areas of advanced technology which hold promise of capabilities beyond those possessed by currently deployed [deleted]

[deleted].

[Deleted].

[Deleted].

The US scientific community believes that the stringent requirements of PB weapons render the developmental problems particularly acute. For example, US uncertainties in the understanding of [deleted].

[Deleted]

[deleted].

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IV. FUNDING ("then year" $ in millions)*

	FY 82 & Prior	FY 83	FY 84 (est)	FY 85 (est)	FY 86 to Completion	Total Dev.
Advanced Radiation Technology (#63605F)	631.9	95.1	86.9	[		]
Advanced Weapons: Laser Applications & Advanced Weapon Concepts (#62601F)	119.7	18.2	18.8			
Space Laser Program (#63603F)	20.0**	0	37.1			
High Energy Laser Technology (#62735N)	415.3	63.2	69.4			
Directed Energy Technology (#62768N)	***	14.9	13.8		[Deleted]	
Laser Weapon Technology (#62307A)	233.0	41.9	34.0			
High Energy Laser Components (#63314A)	0	0	14.5			
Experimental Evaluation of Major Innovative Technologies: EE-7, EE-8 & EE-12 (#62711E)	154.0	71.0	112.3			
Strategic Technology: HEL Technology (#62301E)	350.1	44.7	59.8			
Particle Beam Technology (#62707E)	101.2	31.0	31.0			
[Deleted]	NA	NA	NA	[		

* Development dollars only. [Deleted].

** Funded out of PE 64406F.

*** Not available.

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V. ANALYSIS

A. Consistency with US Arms Control Policy and Related Presidential Decisions.

Four principles underlie the US approach to arms control. The Administration seeks agreements that: involve substantial and militarily significant reductions on both sides; result in lower levels of nuclear forces, based on equal, balanced levels of comparable systems on both sides; include effective means of verification; and enhance US and Allied security and reduce the risk of war. DOD's research and development programs related to possible DE weapons is consistent with this approach.

One purpose of DE research is to stay abreast of technologies having military potential and to gain insight into what the Soviets and others may be discovering through their own research. This activity also helps provide confidence that the US can maintain an adequate balance of forces.

DE weapons could have strategic BMD or ASAT capabilities and some of the current technology programs are focused on these goals. Thus, these programs are reviewed for their consistency with, and potential impact on, the US policy of strategic arms control. The impact of these weapons on strategic stability is discussed below.

B. Relation to Arms Control Agreements.

Except as noted herein, the current DE research programs are not constrained by existing arms control agreements. The BMD potential of future DE weapons could eventually create a

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conflict with the obligations assumed by the US under the provisions of the ABM Treaty.

The ABM Treaty bans the development,* testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. In addition, although the Treaty allows the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams) and including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars, the Treaty prohibits the deployment of such fixed, land-based systems and components unless the Parties consult and amend the Treaty.

The ABM Treaty prohibition on development, testing and deployment of space-based ABM systems, or components for such systems, applies to directed energy technology (or any other

---

* The US interpretation of the term "development," as used in the ABM Treaty, is as follows:

> "The obligation not to develop such systems, devices or warheads would be applicable only to that stage of development which follows laboratory development and testing. The prohibitions on development contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or breadboard model." (As provided by Ambassador Gerard Smith to the Senate Armed Services Committee during its hearings concerning ratification of the ABM Treaty. For more complete discussion see Senate Armed Services Committee Hearing on the Military Implications of the Treaty on the Limitations of Anti-Ballistic Missile Systems and the Interim Agreement on Limitation of Strategic Offensive Arms, 92nd Congress, 2nd Session, July 18, 1972, p. 377.)

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technology) used for this purpose. Thus, when such DE programs enter the field testing phase they become constrained by these ABM Treaty obligations.

With regard to DE systams in an ASAT role, only the actual use of systems to interfere with national technical means (NTM)* used to verify compliance with strategic arms control agreements -- as opposed to development, testing, or deployment of systems that could be used in such roles -- is prohibited under the provisions of the ABM Treaty (Article XII) and the SALT I Interim Agreement (Article V) and Article XV of the unratified SALT II Agreament. (The President has announced that the US will refrain from any action that would undercut existing strategic arms agreements, provided the Soviet Union shows equal restraint.)

Existing treaties and agreements impose certain additional restraints on ASAT activities. For example, Article IX of the Outer Space Treaty requires international consultations prior to any planned activity or experiment, if the sponsor of such activity or experiment has reason to believe it would cause potentially harmful interference with the peaceful space activities of others. Also, Article III of the Outer Space Treaty constrains the use of outer space to activities which are "in the interest of maintaining international peace and security and promoting international cooperation and understanding." Other international agreements

* NTMs are not defined in any international agreament.

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extend specific protections to certain classes of satellites. Under the Direct Communications Link Improvement Agreement, the US and the USSR each "confirms its intention to take all possible measures to assure the continuous and reliable operation" of the emergency satellite system; and, under the International Telecommunication Convention, both are obligated to avoid "harmful interference to the radio services or communications" of other parties.

None of these agreements would affect the development of [deleted] as long as the testing [deleted] did not result in prohibited interference [deleted].

C. Effect on Current and Prospective Negotiations.

Current DOD directed energy programs are consistent with present US positions in arms control negotiations.

The Soviets and the US have, in the past, addressed possible limits on antisatellite systems. Currently the US is proceeding with research on ASAT capabilities, [deleted] [deleted]. The question of ASAT arms control is presently under review.

Considering the lack of significant near-term development of US or foreign PB weapons for ASAT (or other military missions), it is unlikely that PB weapon questions -- as distinct from HEL weapon questions -- would impact on current and prospective negotiations in the near term.

The Soviets, in public and in the Committee on Disarmament Working Group on Radiological Weapons and New Mass Destruction Weapons (MDW), have raised the issue of particle beams produced by accelerators as possibly leading to MDW. They have drafted a proposal on new MDW which would, *inter alia*, ban development

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and manufacture of weapons using "charged and neutral particles to affect biological targets." [Deleted]. Instead, the US has participated, with the Committee on Disarmament, in a continuing review of the potential for development of such weapons. The objective is to frame specific preventive measures when and if necessary. In any case, the PB weapons considered in Section III above would not be classified as new MDW since they are by nature point weapons and could not be converted to have the characteristics which meet the definition of MDW.*

D. Effect on Global and Regional Stability.

[Deleted], no effect, destabilizing or stabilizing, on a global or regional scale is anticipated in the foreseeable future. [Deleted], the near-term impact of this action on other nations would be expected to be slight, with little or no effect on stability.

It is not possible at this time to make a reasonable assessment of the net impact of the HEL program on future global or regional stability. [Deleted].

E. Technological Implications.

There is little doubt that directed energy weapon development is an area of military technology with high priority and potentially great importance to both the US and USSR. In addition, as prototype HEL weapon systems become visible, other

* The definition of MDW includes atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above.

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technologically advanced countries may be attracted to this new area of arms technology, though the cost could be a serious restraint. Interest may increase and diffusion of knowledge is likely to take place [deleted].

If laser weapons do begin to make a difference in military calculations, then their deployment will inspire adversaries to develop countermeasures and/or to increase the numbers of offensive weapons in order to cope with the improved defensive capability of laser systems.

The US PB R&D program is not apt to have significant near-term technological impact since its scale is relatively small compared to HEL technology and to related nonweapon technology. Active pursuit of the basic nonmilitary technology is useful in preventing technological surprise.

F. Potential Interaction with Other Programs.

As described earlier, the successful development of DE weapons offers [deleted]*

[deleted].

[Deleted].

G. Verification.

Arms control agreements with a highly secretive adversary like the Soviet Union cannot be based simply on trust. If the US and the USSR were to conclude a DE weapons-related arms control agreement, the US would have to have effective means of verification to know with confidence that the terms of the agreement were

* [Deleted].

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being honored. In practice, this means the US would have to be able to monitor activities in the areas covered by the treaty in order to detect any violations at a very early stage. Arms control agreements that cannot be effectively verified do not promote US security interests.

In the past, the US has relied primarily on national technical means for treaty compliance monitoring. To provide for effective verification of an arms control agreement related to DE weapon systems it may be necessary to supplement existing NTM with some form of "cooperative" measures. The Reagan Administration has made it clear that the US will insist on verification procedures to ensure full compliance with the provisions of any agreement, including the possibility of measures beyond national technical means, if necessary.

[Deleted].

[Deleted],

[deleted].

[Deleted].*

In the past, our ability to assess [deleted]

* [Deleted].

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[deleted].

[Deleted].

VI. SUMMARY AND OVERALL ARMS CONTROL ASSESSMENT

The high energy laser and particle beam concepts represent new technologies with potential weapon applications. [Delet i]

[deleted].

[Deleted].

[Deleted].

The ABM potential of DE weapons has arms control implications because the 1972 ABM Treaty bans the development, testing, and deployment of all ABM systems and components that are sea-based, air-based, space-based, or mobile land-based. The Treaty does allow the development and testing of fixed, land-based ABM systems and components based on other physical principles (such as lasers or particle beams), including such fixed, land-based components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars. The Treaty, however, prohibits the deployment of such fixed, land-based systems and components unless the Parties consult and amend the Treaty.

[Deleted].

Possible limits on antisatellite systems have been addressed by the US and the Soviets. [Deleted]. The question of ASAT arms control is presently under review.

Given a DE weapon-related arms control agreement, the US would insist on adequate verification measures. NTM alone may not be adequate and some form of "cooperative" measures may be required to contribute to mutual confidence.

[Deleted]

[deleted].

[Deleted], though the DE-related R&D efforts funded in this FY 1984 budget have no more than marginal arms control effects now, this technology deserves continuing attention in the future.

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PART II: ABBREVIATED ARMS CONTROL IMPACT STATEMENTS

DEPARTMENT OF DEFENSE PROGRAMS

SECTION I - Previously Submitted ACIS.

The following Arms Control Impact Statements, which have continuing arms control implications, have had no significant changes in funding, program direction, policy, or international developments that would revise the Administration's analysis as previously forwarded. The need for updated ACIS will be reevaluated as these programs evolve.

<u>Antiship Missile Systems</u>

PE 64367N	TOMAHAWK Missile System
PE 63717N	Command and Control Systems (Advanced)
Procurement	AGM 84A HARPOON
Procurement	BGM-109 TOMAHAWK

<u>Large-Area Ocean Surveillance Systems</u>

PE 24311N	Undersea Surveillance Systems
PE 63788N	Deployable Surveillance Systems
Procurement	SURTASS
Procurement	SOSUS

<u>Strategic Warning and Attack Assessment</u>

PE 12431F	Defense Support Program and Associated Procurement
PE 12423F	Ballistic Missile Early Warning System
PE 31357F/12433F	Integrated Operations Nudets Detection System (IONDS) and Associated Procurement
PE 12417F	CONUS Over-the-Horizon Radar System
PE 63424F	Missile Surveillance Technology
PE 63425F	Advanced Warning System
PE 12411F	Surveillance Radar Stations/Sites
PE 12313F	Ballistic Missile Tactical Warning/ Assessment

<u>Advanced Isotope Separation and Centrifuge Enrichment</u>

DOE	Atomic Vapor Laser Isotope Separation
DOE	Molecular Laser Isotope Separation
DOE	Plasma Separation Process
DOE	Gas Centrifuge Enrichment

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NAVSTAR Global Positioning System	
PE 64778F	NAVSTAR Global Positioning System (GPS) (Air Force)
PE 64778N	NAVSTAR Global Positioning System (GPS) (Navy)
PE 64778A	NAVSTAR Global Positioning System (GPS) (Army)
Fleet Air Defense	
PE 64303N	AEGIS
PE 64352N	Surface-Launched Weaponry Ship Systems
PE 64353N	Vertical Launching System
PE 64365N	STANDARD Missile-2 (N)
PE 64366N	STANDARD Missile Improvements
DOE	W-81 Warhead
Procurement	RIM-66B (STANDARD Medium-Range SM-1)
Procurement	RIM-66C (STANDARD Medium-Range SM-2)
Procurement	RIM-67A/B (STANDARD Extended-Range SM-2)
Procurement	Surface Missile System Ordnance Alteration (SMS ORDALTS) - Area Air Defense TERRIER
Procurement	SMS ORDALTS - Area Defense TARTAR
Medium-Range Air-to-Surface Missile	
PE 63369N	Air-Launched TOMAHAWK
PE 64614F	Medium-Range Air-to-Surface Missile
ASW Stand-off Weapon	
PE 63367N	Common Antisubmarine Warfare Stand-off Weapon
PE 63634N	Tactical Nuclear (TACNUC) Development
DOE	Common ASW Nuclear Payload (Depth Bomb)
Inertial Confinement Fusion	
DOE	Inertial Confinement Fusion (ICF)

SECTION II - Other Programs Which Meet Congressional Criteria for Arms Control Impact Statements.

The activities within the programs listed below are primarily associated with one or more of the following:

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-- Programs in too early an exploratory research and development stage to determine with precision their possible arms control implications.

-- Programs providing continuing normal support for existing missions or deployed operational systems and organizations.

-- Production and procurement of a developed weapon system; nonnuclear munitions, cartridges, projectiles, rockets, etc., and associated equipment; spares and repair parts; associated electronic, communications, training and support equipment; support, storage, industrial and test facilities construction and operations; utility and specialized vehicles, ships, tanks, and aircraft; miscellaneous production charges, first destination charges and outfitting costs. In themselves, none of the activities in this category is judged to have a significant impact on arms control policy or negotiations.

-- Modification or modernization of an already procured system which does not significantly alter the characteristics of the system from an arms control standpoint.

-- Programs which were analyzed as in-depth statements in previous years and found to have little, if any, additional arms control impact.

-- Programs involving miscellaneous research, development, testing, and evaluation of programs not otherwise categorized, which are judged to have marginal, if any, impact on arms control policy or negotiations.

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DEPARTMENT OF DEFENSE PROGRAMS

ARMY (RDT&E)

PE 61102A (A1, Line 2)

Defense Research Sciences

RDT&E funds to support basic and applied research in the physical, engineering, environmental, biological-medical, and behavioral-social sciences directly related to explicitly stated long-term national security needs and to the solution of identified military problems. This program forms the basis for subsequent exploratory and advanced development programs.

PE 62603A (A1, Line 13)

Large Caliber and Nuclear Technology

Includes all exploratory investigations and demonstrations associated with nonnuclear projectile weapons systems of calibers larger than 50 millimeters. Embraces efforts in interior, exterior, and terminal ballistics to include supporting technologies of fuzing, terminal guidance, and energetic materials for all caliber applications. Also includes munitions technology which emphasizes technology development to significantly improve safety and survivability of Army components of nuclear warhead sections.

PE 63316 (A5, Line 98)

Advanced Rocket Control System

Special access program.

PE 63320A (A5, Line 99)

Corps Support Weapons System

RDT&E funds for preparation/completion of ASARC and initiation of validation and demonstration phase for a Corps Support Weapons System (CSWS). CSWS is envisioned as an improved nuclear/conventional and chemical weapons system to attack targets at ranges beyond the capability of cannons and rockets. Will be designed as a replacement for, or modification of the existing LANCE.

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<u>Nuclear Munitions and Radiacs</u> PE 63604 (A5, Line 101)

RDT&E funds for the continued development of the Low-Altitude Defense System (LoADS) and CSWS nuclear warhead programs. Program also includes: development of enhanced safety devices for nuclear weapons; nuclear survivability equipment; and improvements in the nuclear weapons extended range projectile.

<u>Division Support Weapons System</u> PE 63629A (A6, Line 108)

RDT&E funds for the development of prototype Division Support Weapons System (DSWS) vehicles. DSWS is designed to ensure that the Army maintains a responsive, survivable, reliable, and lethal 155mm self-propelled howitzer system through near-term improvement of the currently fielded M109.

<u>Advanced Attack Helicopter</u> PE 64207A (A7, Line 140)

RDT&E funds for the initiation of a preplanned product improvement program to enhance the capabilities of the Advanced Attack Helicopter with emerging technologies. Initial production deliveries of AH-64s to the training base will begin. The AH-64 is an advanced, all-weather, attack helicopter capable of defeating tanks, providing quickly responsive aerial fires as an integral element of the ground forces.

<u>Army Helicopter Improvement Program</u> PE 64220A (A8, Line 146)

RDT&E funds for the continuation of full-scale engineering development (e.g., systems integration tests, logistics, training, preliminary airworthiness evaluation, and DT/OT II) for a modified OH-58 to provide an all-weather, target acquisition and laser designation system at stand-off ranges for Army and Air Force laser-guided munitions.

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Joint Service Rotary-Wing Aircraft Development PE 64222A (A8, Line 148)

RDT&E funds to provide, through a joint service program, the continued full-scale engineering development of an advanced vertical lift aircraft performing as: the Army's platform for its airborne intelligence and electronic warfare mission; the Marine Corps' primary rotary-wing aircraft for medium-lift assault aircraft; the Air Force's combat search/rescue and special operations mission aircraft; and the Navy platform for various missions including antisubmarine warfare, search and rescue, vertical on-board delivery, and airborne early warning.

PATRIOT (SAM-D) PE 64307A (A8, Line 151)

RDT&E funds for a surface-to-air missile system to replace improved HAWK and NIKE HERCULES. Program includes: completion of system environmental qualifications and diagnostics improvement program; continuation of system ECCM enhancements and the post-development software programs; and initation of several major product improvements.

GRASS BLADE PE 64313A (A8, Line 155)

Special access program.

Joint Tactical Fusion Program PE 64321A (A8, Line 159)

RDT&E funds for continued development leading to a critical design review for hardware and a preliminary design review of software. The program objective is to develop and field an all-source analysis system which will provide the tactical commander with a highly automated capability to analyze, correlate,

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fuse, and report intelligence data from numerous tactical and strategic sensor systems. System also provides capability to manage and control intelligence/electronic warfare resources.

Tank Gun Cooperative Development PE 64630A (A9, Line 175)

Includes RDT&E funds for development and integration of a 120mm gun into the M1 tank. The program also provides for development of a family of 120mm ammunition to meet user requirements and for modification, redesign, and development of those components of the M1 necessary to accommodate the 120mm gun system.

Remotely Piloted Vehicles (RPV) PE 64730A (A10, Line 196)

RDT&E funds for remaining full-scale development. The RPV is designed to fulfill the requirement for unmanned aerial target acquisition, target location, artillery adjustment, laser designation, and battlefield post-strike reconnaissance.

Joint Tactical Communication Program (TRI-TAC) PE 28010A (A11, Line 219)

Includes RDT&E funds to begin fielding TRI-TAC-related hardware and continue software development to maintain compatibility between existing communications systems and emerging TRI-TAC systems. TRI-TAC is designed to provide new common use, tactical communications systems to replace existent manpower intensive, nonsecure, antiquated systems.

SATCOM Ground Environment PE 33142A (A12, Line 232)

Continued development of satellite communications terminals for Army tactical ground forces and the Joint Defense Satellite Communication System.

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Kwajalein Missile Range PE 65301A (A12, Line 241)

Includes manpower authorizations, peculiar and support equipment, necessary facilities and the associated costs specifically identified and measurable to RDT&E and military construction funds. Kwajalein Missile Range (a national range) has the mission of providing support for strategic offensive and defensive missile and related developmental test programs.

Support of Development Testing PE 65702A (A12, Line 242)

Provides funding to subordinate activities of the US Army Materiel Development and Readiness Command (DARCOM) for indirect support of development test and evaluation (other than test and evaluation conducted at DARCOM facilities included in the major range and test facility base). Projects include: Cold Regions Test Center; Tropic Test Center; test design and evaluation; meteorological support to RDT&E activities; field smoke assessment; R&D Field Support Activity; Aviation Development Test Activity; US Army Test Facilities Register; US Army Test and Evaluation Command Instrumentation and Development; and TECOM test methodology.

Support of Operational Testing PE 65712A (A13, Line 245)

Provides funds for the conduct of operational testing of Army systems under development so as to support decision-making related to materiel acquisition programs. The program consists of nine projects that provide for the recurring costs of operating the TRADOC test boards; for the direct costs of operational tests of developmental materiel prior to production; for an economical test vehicle via quick reaction testing of material issues related

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to potential Army needs; and for development of instrumentation and simulators for TRADOC/OTEA test organizations.

Program-Wide Activities PE 65801A (A13, Line 247)

Includes funding for civilian and military manpower and other costs incurred for the operation and maintenance of RDT&E-operated Army headquarters and installations (other than major range and test facility bases) and for logistical and other service support to R&D commands designated as Army Managument Headquarters Activities. Also includes support of other administrative activities (e.g., standardization groups and liaison officers) not identifiable with specific research and development projects financed under other program elements. Includes procurement of laboratory special purpose equipment and ADP equipment in support of R&D activities.

DARCOM Major Range/Test Facilities PE 65804A (A13, Line 250)

Includes civilian and military manpower authorizations for necessary facilities, supplies and associated costs at five major DOD development test activities under the US Army Materiel Development and Readiness Command (DARCOM).

DOD High Energy Laser Systems Test Facility PE 65806 (A13, Line 252)

Provides funds to establish and operate a high energy laser system test facility at White Sands Missile Range capable of supporting Army, Navy and Air Force tests of high energy laser systems.

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ARMY (PROCUREMENT)

EH-60A (QUICK FIX) (A2, Line 5)

Procurement of EH-60A QUICK FIX Helicopters. The EH-60A utilizes the BLACK HAWK airframe to employ on-board jammers for electronic warfare and is designed to identify, locate, listen, and disrupt enemy C^3.

AH-64 Attack Helicopter (A2, Lines 7 & 8)

Procurement of AH-64 advanced attack helicopters, the twin engine fully integrated antiarmor weapon system capable of destroying tanks and other armored vehicles under day/night and adverse weather conditions. Aircraft employs HELLFIRE antitank missiles.

UH-60A BLACK HAWK (A2, Lines 9 & 10)

Procurement of UH-60A BLACK HAWK helicopters, the twin engine squad carrying helicopter. UH-60A will enhance tactical mobility with increased speed, lift-capacity, range, maintainability, and survivability.

AH-1S Attack Helicopter (COBRA/TOW) Modifications (A3, Line 17)

Provides funds for six product improvement programs on the COBRA/TOW. These are: improved attitude-heading reference system; radar jammer; improved windshields; laser warning receiver; improved sand and dust separators; and nap-of-the-earth communications.

CH-47C Cargo Helicopter (CHINOOK) (A3, Line 8)

Provides funds for continuation of the CHINOOK modernization program, the currently deployed tandem-rotor helicopter which

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provides air mobility for artillery weapons, ammunition, bulk fuels, troops, general cargo, medical evacuation, and recovery of downed aircraft. Modifications include: new rotor blades; new engines; transmission and drive systeme; modularized hydraulics; electrical systeme; advanced flight controls; triple hook cargo systeme; and an auxiliary power unit.

Army Helicopter Improvement Program (AHIP) (Modifications) (A3, Line 25)

Provides funds for long-lead-time items for conversion of OH-58A helicopters to AHIP configuration. Iteme include: transmissions; gearboxes; main rotor masts; material for main rotor blades; electrical components; sensors; microelectronic parts; engines; and avionics.

Spare and Repair Parts (Aircraft) (A4, Line 29)

Continuing procurement of initial spares and repair parts, replenishment speres and repair parts, and avionics spare parts for Army aircraft.

Common Ground Equipment (A4, Line 31)

Procurement of tools, shop sets, aviation ground support equipment, airfield support equipment, flight simulators and other individual items.

PATRIOT (SAM-D) (A6, Line 4)

Continues procurement of the PATRIOT missiles and fire units. PATRIOT is an advanced surface-to-air missile system with a high single shot kill probability, and a capability for operation in an

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ECM environment. Its mission is to provide area air defense of the division, corps and high-value assets in the rear area. PATRIOT will replace the HAWK and NIKE HERCULES.

(A6, Line 5)

STINGER

Continues procurement of STINGER missiles and ground support equipment. An air defense weapon, STINGER has greater accuracy and a significantly improved engagement capability than REDEYE, which it replaces.

(A6, Line 6)

Laser HELLFIRE System

Provides funds for the continued procurement of the HELLFIRE missile and associated support equipment. HELLFIRE has been developed as the primary antiarmor weapon for the AH-64 Attack Helicopter.

(A6, Line 8)

TOW (BGM-71A) (BTM-71A)

Provides for the continued procurement of TOW missiles and provides blast simulators needed for training. TOW is designed as an improved tactical weapon to defeat the increasing armor threat.

(A6, Line 10 & 11)

Multiple Launch Rocket System (MLRS)

Continued procurement of MLRS rockets and associated ground support equipment. MLRS is a self-propelled multiple rocket launcher system designed to counter enemy field artillery and air defense systems and supplement cannon artillery.

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HAWK (Modifications) (A7, Line 14)

Continued procurement of HAWK modifications to improve the firepower, training, target tracking, and low-altitude target reporting capabilities of each fire unit.

TOW (Modifications) (A7, Line 15)

Procurement of improved warheads for tactical missiles and guidance system hardening.

Spares & Repair Parts (Missiles) (A7, Line 22)

Continuing procurement of initial spares and repair parts, replenishment spares and missiles for Army missile systems.

Production Base Support (Missiles) (A7, Line 25)

Continued procurement of equipment used for production testing and depot maintenance support. Development of manufacturing methods and technology projects that deal with the advancement of manufacturing techniques.

Bradley Fighting Vehicles (A10, Lines 4 & 5)

Procurement of infantry and cavalry fighting vehicles. Systems are full-tracked, armored vehicles which provide mechanized infantry and cavalry units with protected cross-country mobility and improved vehicular mounted firepower. Vehicles are designed to be compatible with the new M1 main battle tank.

Training Devices (F/IFV/CFV) (A10, Line 6)

Procurement of simulators for training Fighting Vehicle System crews. These training devices will be deployed at Army schools

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for individual training of infantry and cavalry fighting vehicle gunners and commanders and will employ highly realistic battle scenario simulations rather than actual firing on the range.

Field Artillery Ammunition Support Vehicle (A10, Line 7)

Continued procurement of FAASVs as replacements for the current ammunition support vehicles in self-propelled field artillery units in Europe. The FAASV provides armor protection for the ammunition and crew as well as new equipment to make ammunition handling less manpower-intensive.

Recovery Vehicle, Med, FT, M88-A1 (A10, Line 8)

Procurement of M88-A1s to meet the needs of armor units for required tank recovery capability.

Abrams Tank, M1 (A10, Lines 9 & 10)

Procurement of M1 main battle tanks. The M1 will initially mount a 105mm main gun and three complementary armament systems with improved fire control and shoot-on-the-move capabilities. It will have improved ballistic protection, higher cross-country speeds and faster acceleration. In FY 1985, it will incorporate a 120mm gun.

FIST Vehicle Modification (A11, Line 19)

Continued procurement of kits required to convert M113 armored personnel carriers to fire support team vehicles. FIST vehicles will provide protection for the Ground Laser Locator Designator.

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<u>M60 Series Tank (Modification)</u> (All, Line 24)

Procurement of kits to convert M60-A1 to M60-A3 configuration. The M60-A3 employs a solid-state computer, laser range-finder and thermal site.

<u>Spares and Repair Parts (Weapons and Tracked Combat Vehicles)</u> (All, Line 25)

Initial procurement and replenishment of spares and repair parts related to tracked combat vehicles.

<u>Production Base Support (TCV-WTCV)</u> (All, Line 27)

Includes depot maintenance and plant equipment requirements. Major areas of emphasis are: (a) M1 production support; (b) 120mm gun integration; and (c) rehabilitation of the Stratford Army Engine Plant and modernization of fire control production facilities.

<u>DIVAD Gun</u> (All, Lines 26 & 29)

Continues procurement of an all-weather Air Defense System consisting of twin 40mm cannons, search and track radars mounted on a M48A5 tank chassis. Will provide air defense for divisional maneuver elements against attack by armed helicopters and high performance fixed wing aircraft.

<u>Spares and Repair Parts (Weapons and Tracked Combat Vehicles/Support Equipment and Facilities)</u> (A12, Line 43)

Initial procurement and replenishment of spares and repair parts related to weapons and tracked combat vehicles.

<u>Nuclear Weapons Support Material</u> (A14, Line 1)

Provides for continuing procurement of nuclear weapon support material for deployed operational systems.

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Conventional Ammunition Procurement (A14-16, Lines 4-48)

Provides for procurement of conventional ammunition of various types and categories for the US Army. Includes: cartridges, fuzes, projectiles, primers, small missiles and rockets, and mines.

Provision of Industrial Facilities (Ammunition) (A16, Line 49)

Provides for establishment, rehabilitation, modernization, and expansion of government-owned facilities to support production of ammunition.

HIMOB, Multipurpose Wheeled Vehicle (HMMWV) (A18, Line 15)

Procurement of a single family of vehicles, utilizing a common chassis with various body configurations, to meet Marine Corps, Air Force, and Army requirements. Vehicle is designed to replace the current family of 1/4 - 1 1/4 ton vehicles.

Commercial Utility and Cargo Vehicle (CUCV) (A18, Line 16)

Procurement of a family of light commercial 4 X 4 diesel trucks with a payload of 2500 pounds for cargo and ambulance and a payload of 1500 pounds for utility vehicles.

Truck, 5T, 6 X 6, All Body Types (A18, Line 18)

Procurement of 5-ton wheeled tactical vehicles. Vehicle is produced in 7 body styles: cargo, dump, tractor, van, wrecker, stake, and bolster.

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Truck, 10T, 8 X 8, All Body Types (A18, Line 19)

Procurement of 10-ton wheeled tactical transport vehicles. Truck is required to transport ammunition, petroleum, and missile systems, and can be used for recovery of other heavy wheeled support vehicles and combat systems. Major systems supported include MLRS, PERSHING II and PATRIOT.

General Purpose Vehicles (GPV) (A19, Line 25)

GPVs support training, security, law enforcement, medical and general base transportation functions. Items include standard commercial vehicles such as trucks, tractors and semi-trailers.

Spare and Repair Parts (Tactical Vehicles) (A19, Line 27)

Provides for the continuing procurement of spares and repair parts for Army tactical vehicles.

Joint Tactical Communication System (TRI-TAC) (A20-21, Lines 32-67)

Procurement of switched communication secure equipment for tactical common user and command and control voice, record, and data subscribers. System will be interoperable with US strategic and commercial systems as well as Allied and NATO communications systems.

Defense Satellite Communications (A24, Lines 125-132)

Procurement of a Defense Satellite Communication System to accommodate a wide range of global, strategic and tactical communications requirements.

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Speech Secure Equipment TSEC/KY-57 (A25, Line 157)

Procurement of tactical secure voice equipment designed for manpack and vehicular application. Provides secure transmissions for tactical systems such as TACFIRE and FIREFINDER.

Spares and Repair Parts (Electronics) (A30, Lines 244-246)

Provides funds for the procurement of initial and replenishment spares and repair parts to support Army electronic systems.

Medical Support Equipment (A36, Line 352)

Procurement of equipment required to support health care programs in fixed TDA/MTDA medical facilities/activities worldwide. Includes initial and replacement equipment for Army health care facilities.

Mask, Protective, NBC (A32, Line 280)

Continues replacement of worn-out, obsolete and over-age protective masks currently in the inventory with M17A2 masks.

Combat Support Equipment, Medical (A33, Line 305)

Continues to provide the interior equipment for tactical field hospitals to reach the 106 hospital level.

Grader, Road Motorized, Heavy, 6 X 4 (CCE) (A34, Line 317)

Continues 3rd year of standardization program to replace over-age, obsolete, maintenance-intensive graders with a single commercial item for the entire Army.

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Loader, Scoop Type, DD4WHL 2 1/2 cu. yd. (A34, Line 318)

Continues 3rd year of standardization program to replace over-age, obsolete, maintenance-intensive loaders with a single commercial item for the entire Army.

Scraper, Earthmoving, 14-18 cu. yd. (A34, Line 323)

Continues 3rd year of standardization program to replace over-age, obsolete, maintenance-intensive scrapers with a single commercial item for the entire Army.

Tractor, Full-Tracked, Low Speed DD Med. (A34, Line 324)

Begins first year of standardization program to replace over-age, obsolete, maintenance-intensive tractors with a single commercial item for the entire Army.

Generators and Associated Equipment (A35, Line 335)

Continues to procure the interchange generators required to support fielding of major weapons systems and communications equipment. In addition, begins to replace over-age, obsolete, maintenance-intensive generators that are being washed out of the inventory.

Training Devices, Non-System (A36, Line 361)

Continues procurement of laser engagement simulation systems which allow for improved training effectiveness and cost efficiency. Initiates the procurement of the Infantry Remote Target System (IRCTS) that will standardize range training.

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(A36, Line 362)

Base Level Commercial Equipment

Provides funds for Major Commands to procure items costing $3,000.00 or more which are not centrally managed for performing day-to-day operations at posts, camps and stations throughout the world.

NAVY (RDT&E)

PE 61153N (N1, Line 2)

Defense Research Sciences

A continuing program, the purpose of which is to conduct research in the physical, engineering, environmental and life sciences in order to obtain information and understanding which can lead to discoveries of potential importance to the Navy, the solution of Navy technical problems, and the improvement of Navy operations.

PE 62542N (N1, Line 6)

Nuclear Propulsion Technology

A comprehensive exploratory development program directed toward the development and application of advanced technologies for potential utilization in Navy nuclear propulsion plants.

PE 64709N (N4, Line 60)

Prototype Manpower/Personnel Systems

RDT&E funds to develop and test implementation for recent adjustment and fleet orientation training programs. Program also includes continuation of addressal of major manpower personnel and training issues that can benefit from a joint R&D approach.

PE 11224N (N4, Line 67)

SSBN Security Program

Provides for a technological assessment of the potential capabilit[y] of the Soviet Union to threaten covert mobility of the Fleet Ballistic Missile Submarine Force and development of countermeasures technology.

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PILOT FISH

PE 63525N (N7, Line 120)

Limited access program.

RETRACT SILVER

PE 63537N (N7, Line 129)

Limited access program.

Submarines

PE 63561N (N7, Line 133)

Advanced submarine development programs which include: atmosphere control systems; propulsion safety; efforts to extend operational depths of future submarines; damage control equipment; shock hardening and submarine propellers.

Guided Missile Destroyer, DDGX

PE 63589N (N8, Line 147)

RDT&E funds to perform preliminary ship design phases and conduct engineering development for selected systems/subsystems for the new multimission guided-missile destroyer.

Advanced ASW Torpedo

PE 63610N (N8, Line 150)

This program is designed to develop a new torpedo capable of countering predicted improvements in Soviet submarine performance characteristics. It will replace the current lightweight MK-46 torpedo.

Marine Corps Assault Vehicle

PE 63611M (N8, Line 151)

Provides funds to design, develop, and test wheeled and tracked vehicles and engines which will meet the firepower and mobility requirements for amphibious operations.

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Integrated Tactical Surveillance System PE 63763N (N9, Line 170

RDT&E funds to develop systems including new and modified sensors, processing and dissemination elements, and user modules in order to provide all-weather day/night surveillance of high interest aircraft and ships in ocean areas.

Special Processes PE 63787N (N9, Line 173

A continuing controlled access program.

AV-8B Aircraft PE 64214N (N9, Line 182

Provides funds for continued RDT&E of light attack aircraft designed to operate from austere forward sites in direct support of ground forces. Aircraft will meet Marine Corps requirements as follow-on improvement to the HARRIER.

S-3 Weapons System Improvement PE 64217 (N10, Line 185)

Provides funds for a modification program designed to improve the mission system effectiveness of the carrier-based S-3A aircraft to meet current and projected threats. Current program addresses acoustic and nonacoustic improvements (radar, electronic support measures, HARPOON Launch, chaff and flare dispensing).

Aircraft Engine Component Improvement Program PE 64268N (N11, Line 2(

This program provides the engineering support required to obtain changes which are essential for satisfactory system performance throughout the operational life of the system.

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<u>CG-47 Aegis Product Improvement</u> PE 64307 (N11, Line 209)

Provides funds to continue the engineering necessary to upgrade the Aegis Combat Systam so that later ships of the class will retain battle effectiveness against escalating Soviet threat.

<u>Submarine Combat Systems Development</u> PE 64524N (N12, Line 240)

Provides for competitive engineering development of a new generation combat suite for attack submarines; intended to provide the ships with clear tactical superiority in engagements with improved threat platforms.

<u>Advanced Lightweight Torpedo</u> PE 64610N (N13, Line 259)

RDT&E funds to develop a new torpedo designated ALWT, capable of countering the projected submarine threat of the post-1985 period, as a replacement for the MK-46.

<u>MK-48 Advanced Capability Torpedo</u> PE 64675N (N13, Line 265)

Funds to accomplish design, engineering development, test and evaluation of the submarine-launched MK-48 Advanced Capabilities Torpedo to counter the Soviet threat in the 1985-2000 timeframe.

<u>Tactical Information Systems (JTIDS)</u> PE 25604N (N15, Line 303)

Provides funds for the Joint Tactical Information Distribution Systems and integrated communication, navigation and identification system which will provide secure, jam-resistant communication in aircraft applications.

<u>Special Activities Support</u> PE 34111N (N18, Line 352)

A continuing limited access program.

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<u>ATLANTIC Undersea Test/Evaluation Center</u> PE 65852N (N18, Line 366)

This program provides, on a continuing basis, the operational maintenance support for the Navy's only secure and fully instrumented antisubmarine warfare test and evaluation range.

<u>RDT&E Laboratory/Facility Management Support</u> PE 65861N (N19, Line 371)

A continuing program which provides for certain program-wide management and operations costs at specified R&D laboratories and other facilities.

<u>RDT&E Ship/Aircraft Support</u> PE 65863N (N19, Line 373)

Includes RDT&E funds to provide for operation and maintenance of ships and aircraft assigned for support of weapon system RDT&E projects. Also funds aircraft conversions to target drones in support of weapon system testing.

<u>Test/Evaluation Support</u> PE 65864N (N19, Line 374)

The annual institutional funding for the operation, maintenance and test instrumentation and separate improvement at four of the six Navy DOD major range and test facility base activities. These facilities include Pacific Missile Range, Naval Air Test Center, Naval Air Propulsion Test Center and Naval Weapons Center Ranges. In addition, investment costs at Lakehurst Naval Air Station are funded within this program element.

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NAVY (PROCUREMENT)

A-6E Attack Intruder (N2, Lines 1-2)

Continued procurement of day/night, all-weather carrier-based attack aircraft, capable of delivering nuclear and nonnuclear weapons as well as of night surveillance and identification.

EA-6B (PROWLER) (N2, Lines 3 & 4)

Continued procurement of the four-place, twin-engine, advanced electronic warfare aircraft which provides protection to Navy strike aircraft through a computer-controlled electronic surveillance control system and high-power jamming transmitters.

AV-8B (V/STOL) (N2, Lines 6 & 7)

Continued procurement of V/STOL aircraft with twice the range or payload of the current HARRIER, capable of delivering air-to-ground weapons under day and night conditions.

F-14A (TOMCAT) (N2, Lines 8 & 9)

Continued procurement of carrier-based air superiority/fleet air defense fighters capable of air-to-air combat and air-to-surface attack missions. System has visual attack and all-weather capability.

F-18 (HORNET) (N3, Line 11)

Continued procurement of single seat, carrier-based, high performance, multimission fighter aircraft. Missions include fleet air defense, air superiority, air-to-ground interdiction.

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<u>CH-53E SUPER STALLION</u> (N3, Lines 12 & 13)

Continued procurement of the three-engine, shipboard compatible, Navy and Marine Corps heavy-lift helicopter. Designed for heavy cargo/troop/transport in Marine Corps missions. Navy missions include vertical on-board delivery for fleet replenishment.

<u>AH-1T (Helicopter) SEA COBRA</u> (N3, Lines 14 & 15)

Begin procurement of an attack helicopter designed to provide high-speed maneuverability, ground-fire suppression during aerial and ground escort operations, landing zone preparation and aerial search and destroy missions.

<u>SH-60B (LAMPS MK III)</u> (N3, Lines 16 & 17)

Continued procurement of the small sea-based helicopter configured to operate from destroyer-type ships. The SH-60B is optimized for antisubmarine warfare with a secondary mission of antiship surveillance and targeting.

<u>P-3C ORION</u> (N3, Lines 18 & 19)

Land-based, multi-engine, turboprop, maritime patrol aircraft with primary mission of ASW warfare. Secondary missions are maritime reconnaissance, aerial mining, shipping destruction and intelligence collection. Programmed force level is the procurement of 24 squadrons by FY 1986.

<u>E-2C HAWKEYE</u> (N3, Lines 20 & 21)

Continued procurement of the carrier-based, twin-engine, turboprop airborne early warning aircraft designed for airborne early warning and command and control under all weather conditions.

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SH-2F (ASW Helo) SEA SPRITE (N3 & N4, Lines 22 & 23)

Continued procurement of twin-engine helicopter designed as the air subsystem of the LAMPS MK1 weapon system. System is deployed aboard FF1040 and FF1052 class frigates in the primary role of antisubmarine warfare.

C-9B (SKY TRAIN II) (N4, Line 24)

Continued procurement of a commercial land-based rapid air transport for high priority personnel and cargo.

C-2A (GREYHOUND) (N4, Lines 26 & 27)

Continued procurement of a personnel/cargo transport type aircraft capable of all-weather carrier operations.

A-6 Modifications (N5, Line 36)

Hydraulic, electrical and avionics modifications to the A-6 all-weather attack aircraft that extends the service life and updates the capabilities of the aircraft.

EA-6 Series Modifications (N5, Line 37)

A series of modification programs to update carrier-based electronic warfare aircraft. Modifications are designed inter alia to improve reliability and maintainability, enhance survivability, lessen life cycle costs and improve readiness.

A-7 Modifications (N5, Line 38)

Primarily avionic modifications to the carrier-based, attack A-7 aircraft. Will provide a passive night vision capability to enhance weapons delivery accuracy during night operations, improve navigation, provide countermeasures warning, and improve operational readiness, and minimize life cycle costs.

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(N5, Line 42)

P-14A Modifications

A series of modifications, the most significant of which is the replacement of redesigned engine components to achieve improved durability, reliability, and maintainability of the aircraft.

(N6, Line 47)

H-46 Modifications

Major modifications include service life extension work on the basic airframe, rotorblade improvements and navigation equipment modernization for the Navy's general purpose logistics and troop carrying helicopter.

(N6, Line 53)

P-3 Series Modifications

A series of modifications, the most significant of which are associated with the HARPOON missile and the infrared detecting system.

(N6, Line 56)

E-2 Series Modifications

Modification incorporates an advanced radar processing system that allows fully automatic overland detection and improved electronic counter-countermeasures.

(N7, Line 72)

Common ECM Equipment

Provides funds for development and procurement of radar warning receiver system and related systems and EW systems improvements.

(N7, Line 74)

Spares and Repair Parts (Aircraft)

Repairable parts procured in support of operating forces and industrial activities within the naval aviation establishment. Includes all Navy aircraft.

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Common Ground Equipment (N7, Line 75)

Common ground equipment includes avionics support, aircraft systems trainers, training aids and devices, and miscellaneous aircraft maintenance and ground support equipment.

AIM 7/M SPARROW (N10, Line 10)

Continued procurement of a conventionally armed, radar-guided (SPARROW-III) missile used in air-to-air and ship-to-air weapon systems now in the inventory.

AIM 54A/C PHOENIX (N10, Lines 12 & 13)

Continued procurement of a conventionally armed, air-to-air, guided missile carried aboard the F-14 aircraft in order to replenish training ammunition expended and to outfit new squadrons.

AGM-88A HARM Missile (N10, Line 15)

Continued procurement of the high-speed, air-to-surface, anti-radiation, HARM missile designed to suppress or destroy land- and sea-based radars supporting enemy air defense systems.

Aerial Targets (N10, Line 24)

Procurement of aerial targets to provide realistic presentations of potential threats to support Navy training in the use of missiles and antiaircraft guns.

AIM-54A/C PHOENIX Mod (N10, Line 27)

Funds retrofit effort to reconfigure AIM-54A missiles to the AIM-54C configuration. Results in additional quantity of AIM-54Cs at 19% cost savings per missile and avoids need for major repair effort on AIM 54As.

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(N11, Line 35)

Spares and Repair Parts (Missiles)

Spares and repair parts for the repair of missiles or components which fail or are damaged while in the fleet.

(N11, Line 35)

Fleet Satellite Communications

Continued procurement of satellites to be placed in geo-stationary orbits to provide protected communications to all Navy ships plus a vital command-control service to all antisubmarine warfare platforms, fleet ballistic missile submarines, aircraft carriers, cruisers, and other selected ships and submarines.

(N11, Line 38)

Torpedo, MK-48

Continued procurement of submarine-launched, high-speed acoustic torpedos effective against fast, deep-diving, high performance submarines and surface ships.

(N11, Lines 39 & 40)

Torpedo MK-46 (NEARTIP)

Provides for the continued procurement of the MK-46 lightweight ASW torpedo launched from surface ship torpedo tubes, ASROC launchers, and fixed and rotary wing aircraft.

(N12, Line 41)

MK-60 (CAPTOR)

Provides for the continued procurement of CAPTOR weapons, and fleet support items. The CAPTOR is a moored, influence-activated, ASW mine which employs a modified MK-46 torpedo as a payload.

(N12, Line 47)

Torpedo MK-48 Modifications

The MK-48 torpedo is an in-service conventional weapon used in both the ASW and antiship role. Modifications are aimed at improving reliability, maintainability and reducing life cycle costs.

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MK-15 (PHALANX) Close-in Weapons System (N12, Line 52)

Provides for the backfit of the PHALANX fast-reaction, last-ditch, air defense system in active fleet ships.

CVN Aircraft Carrier (Nuclear) (N15, Lines 5 & 6)

Procurement of the NIMITZ class, nuclear-powered aircraft carriers, designed to support and operate aircraft to engage in attacks on land and sea, and to engage in sustained operations in support of other forces.

SSN-668 Class Submarine (Nuclear) (N16, Lines 7 & 8)

Continued procurement of LOS ANGELES class high-speed nuclear-powered attack submarines, designed to destroy enemy ships, primarily submarines.

Battleship Reactivation (N16, Lines 11 & 12)

Continued procurement to upgrade fleet capabilities in the near term by returning the IOWA class battleships (IOWA, NEW JERSEY, MISSOURI, WISCONSIN) to the fleet with augmented strike capability and at a minimal cost relative to the procurement of new construction combatants.

CV Service Life Extension Program (SLEP) (N16 & 17, Lines 13 & 14)

The aircraft carrier service life extension program (SLEP) will extend the life of FORRESTAL class aircraft carriers from 30 years to 45 years. Includes propulsion, auxiliary equipment and electronics.

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(N17, Line 16)

CG-47 AEGIS Cruiser

New class of guided-missile cruiser, armed with AEGIS and other advanced AAW/ASW/SUW systems to operate with Main Battle Groups and Amphibious Task Groups. The CG will be a broadly capable, heavily armed and survivable cruiser for the Navy.

(N17, Line 17)

DDG-51

Advanced procurement for long-lead-time equipment for a Guided Missile Destroyer, designed to operate offensively in units of Carrier Battle Groups and Surface Action Groups, and in support of Underway Replenishment Groups and Amphibious Assault Groups in multithreat environments including air, surface and subsurface.

(N17, Lines 18 & 19)

LSD-41 Landing Ship Dock

Continued procurement of amphibious assault ships designed to transport and launch loaded amphibious craft and vehicles with their crews embarked and personnel amphibious assault operations.

(N18, Lines 20 & 21)

LHD-1

Continued procurement of an amphibious assault ship designed to embark, deploy and land elements of a marine landing force in an assault by helicopters, V/STOL aircraft, landing craft and amphibious vehicles.

(N18, Line 22)

FFG Guided-Missile Frigate

Continued procurement of FFG-7 class frigates which are designed to provide self-defense and supplement existing escorts in the protection of underway replenishment groups, amphibious forces and mercantile shipping.

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MCM Mine Countermeasures Ship (N18, Line 23)

Continued procurement of mine countermeasures ships designed to conduct mine clearance operations in maintenance of sea lines of communications, in defense of ports and harbors, and in support of fleet operations.

MSH-1 (N18, Line 24)

Procurement of a mine sweeper hunter ship with a very low magnetic signature design, variable depth mine hunting sonar, and precise navigation system designed to provide the US Navy with the capability to conduct channel clearance and conditioning in ports and their coastal approaches.

TAO Fleet Oiler (N18, Lines 25 & 26)

Continued procurement of fleet oilers, designed to operate as units of underway replenishment groups, in order to furnish petroleum products to operating forces at sea.

AGOS SWATH Ship (N18 & 19, Lines 28 & 29)

Procurement of Small Waterplane Area Twin Hull (SWATH) Ocean Surveillance Ships designed to collect, process, and transmit acoustic data.

ARS (N19, Lines 30 & 31)

Continued procurement of ARS-50 class salvage ships, designed to operate as units of the Mobile Logistic Support Force to provide salvage, rescue towing, diving and rescue service to the Fleet.

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(N19, Line 34)

TAHX

Continued procurement of Hospital Ships designed to provide full medical support on a worldwide basis to the Rapid Deployment Joint Task Force and other US forces engaged in combat operations or located in areas where hostilities may be imminent.

(N19, Line 36)

Service Craft

Continued procurement of Cargo Barges, Training Craft and Harbor Tug Boats.

(N19, Line 38)

Landing Craft

Continued procurement of Air Cushion Landing Craft (LCAC).

(N19, Line 39)

Outfitting

Government furnished repair parts and other material, including stock fund items and general use consumables, required to fill ships' initial allowance of storeroom and operating spare items.

(N19, Line 40)

Post Delivery

Design, planning, government furnished material and related labor costs required to correct ship deficiencies defined during acceptance and shakedown trials.

(N19, Line 41)

Ship Contract Design

Funding for efforts which occur during the Contract Design Phase including an engineering data package consisting of contract drawings, contract guidance drawing and ship specification.

(N24, Line 46)

Reactor Power Units

Assemblies of nuclear fuel and associated structural and reactivity control equipment required for the periodic refueling of nuclear-powered ships.

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Reactor Components (N24, Line 46)

Includes the components, equipment and material required to provide minimum support needed for the continued safe and reliable operation of Navy nuclear propulsion plants. Funds are programmed for acquisition of replacement components for ship alterations, replacement of stock spare components, and equipment necessary for refueling nuclear-powered ships.

AN/SQS-53 (Communications & Electronic Equipment) (N26, Line 73)

Initial procurement of shipboard kits, a maintenance trainer, operator trainer hardware and associated production engineering support to improve system maintainability and reduce manning levels of antisubmarine warfare control systems aboard various destroyers, cruisers, guided-missile destroyers and guided-missile cruisers.

AN/BQQ-5 (Communications & Electronic Equipment) (N26, Line 74)

Continued procurement of submarine sonar system upgrade kits and associated production and engineering support providing major capability improvements over the existing sonar system.

FBM System Sonars (N26, Line 79)

Continued procurement of the Fleet Ballistic Missile (FBM) System Sonar resulting in the replacement of the present towed array system with a longer aperture array, improved memory and processor modifications and solutions to major operational and maintenance deficiencies identified by users.

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AN/SQR-19 Towed Array Sonar (TACTAS) (N27, Line 91)

Continued procurement of AN/SQR-19 TACTAS system designed to be the primary passive Antisubmarine Warfare sensor for surface combatants.

Naval Tactical Data System (N28, Line 113)

Continued procurement of the Naval Tactical Data System providing a general purpose combat direction system in major warships permitting rapid integration of ship sensor information; analysis of operational data and initiation of instantaneous ship or fleet reaction in accordance with fleet doctrine stored in computer memories.

SATCOM Ship Terminals (N31, Lines 164 & 165)

Program continues the procurement of demand-assigned, multiple-access systems which provides up to a five-fold increase in satellite channel capacity. These terminals provide high data rate antijam communications via the DS/CS satellite systems.

Spares and Repair Parts (N33, Line 208)

Provides for procurement of electronic parts and assemblies for miscellaneous communications and electronic equipment.

AN/SSQ-53 DIFAR (N33, Line 212)

Continued procurement of a passive, directional sonobuoy used during the localization phase of the air-ASW mission; provides accurate target localization information.

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AN/SSQ-77 (VLAD) (N34, Line 215)

Continued procurement of a passive, directional sonobuoy that provides a 7-10 db improvement over the current AN/SSQ-53A system.

General Purpose Bombs (N34, Line 218)

Provides funds for continuing procurement of general purpose bombs to support Navy mission requirements.

LAMPS MK III Shipboard Equipment (N35, Line 248)

Continued procurement of equipment to be installed in existing ships being backfitted with the LAMPS MK III weapon system. The equipment includes an electronic sonar signal processing system, a shipboard terminal data transmission device and the shipboard helicopter landing system for the LAMPS MK III helicopter.

5/54 Ammunition Components (N36, Line 257)

Provides for continued procurement of ship gun ammunition (20mm thru 8-inch). Includes ammunition required for fleet training, gun calibration tests, new production trials and reserve ammunition.

Surface TOMAHAWK Support Equipment (N37, Line 273)

Provides for continued procurement of armored box launchers and vertical launchers for the TOMAHAWK cruise missile for destroyers and guided-missile cruisers.

MK-117 Fire Control System (N37, Line 281)

Provides for continued procurement of the All Digital Attack Center, designated the MK-117 Fire Control System, for installation aboard various submarines as a replacement for the current

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MK-113 system. The MK-117 is designed to engage modern, high-speed, quiet targets and has greater mission reliability and maintainability than its predecessor.

Spares & Repair Parts (Ordnance Support Equipment) (N39, Line 306)

Provides for procurement of initial spare parts to support new end items, and for the replenishment of spare parts consumed by the fleet.

Amphibious & Special Equipment (N39, Line 317)

Provides the Naval Construction Force with the equipment necessary to maintain a readiness to meet contingency requirements. Includes funds for the Maritime Prepositioning Program in support of the Joint Rapid Deployment Task Force.

Fleet Hospital Support Equipment (N40, Line 327)

Provides for continued procurement of Fleet Hospital Support Equipment to provide medical support for Navy and Marine personnel during Joint Rapid Deployment Task Force wartime operations.

Intelligence Support Equipment (N42, Line 377)

Provides for procurement of equipment needed for the Naval Intelligence Command and its field activities.

Projectile, 155mm, ICM (DP) (N45, Line 19)

Provides funding for continued procurement of improved conventional munitions projectiles for 155mm howitzer.

LVT7A1 (N47, Line 49)

Continues a procurement effort for materiel and vehicle assembly.

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LVT7 Service Life Extension Program (SLEP) (N47, Line 50)

Continues procurement of kits for the conversion of LVT7 SLEP vehicles. The LVT7 SLEP is a product improvement program designed to extend the useful life of the present amphibious vehicle.

Light Armored Vehicle (N47, Line 51)

Continues the procurement of the light armored vehicle. Vehicle is fully equipped with weapons, fire control systems, support equipment and supplies. These vehicles will be used to begin formation of a rapidly deployable combat unit.

Improved HAWK (N48, Line 73)

Continues procurement program to equip three HAWK battalions with four TRIAD batteries each.

STINGER Missile System (N48, Line 75)

Continues procurement of STINGER missiles as a replacement for the obsolete REDEYE missile. The STINGER has greater accuracy and significantly improved engagement/attack capabilities.

TOW Missile System (N48, Line 77)

Provides for continued procurement of TOW missiles and support equipment for the USMC Mobility Enhancement Program.

AN/PSC-2 Digital Communications Terminal (DCT) (N50, Line 110)

Continued procurement of the DCT, a handheld programmable input/output unit used for composing, editing, transmitting, receiving, and displaying messages in conjunction with standard military radios.

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(N51, Line 122)

Position Locating Reporting System (PLRS) AN/TSQ-129

Continued procurement of a lightweight portable tactical command and control system which automatically provides accurate, real-time position location information relative to friendly combat elements to the tactical commander, allowing better maneuver control, deployment optimization, and more effective fire and air support coordination.

(N51, Line 123)

Tactical Air Operation Center-85

Provides funds for specific improvements of Marine Corps air C^3 systems.

(N53, Line 155)

5/4T Truck HMMWV

Continued procurement of 5/4-ton high-mobility multipurpose wheeled vehicles (HMMWV) configured to meet multimission roles, to include: command and control, TOW weapons platform, communications and personnel carrier.

AIR FORCE (RDT&E)

PE 61102F (F1, Line 2)

Defense Research Science

The funding base for a continuing program to obtain scientific knowledge required to provide alternatives for future development, prevent technological surprise, and assist in the solution of technical problems, thereby enhancing Air Force mission area operational capabilities. Program maintains in-house scientific expertise for immediate availability when needed by the Air Force.

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Aerospace Flight Dynamics PE 62201F (F1, Line 5)

Provides the flight vehicle technologies required for the design and development of future aircraft, missile and spacecraft, and for the improvement of current vehicles. The program also provides for the operational support and management of the Air Force Flight Dynamics Laboratory (AFFDL) located at Wright-Patterson AFB, Ohio.

Aerospace Propulsion PE 62203F (F1, Line 7)

Program develops the propulsion and power technology in support of current and future aerospace vehicles and weapon systems. The program also provides for the operation and management of the Aerospace Propulsion Laboratory (AFAPL) located at Wright-Patterson AFB, Ohio.

Aerospace Avionics/VHSI Circuits PE 62204F (F1, Line 8)

This program develops avionics technology which improves the functions of aerospace vehicle command, control, navigation, penetration, defense, reconnaissance, fire control, and weapon delivery. These improvements will result in higher reliability, and greater mission effectiveness. The program also provides for the operations and management of the Air Force Avionics Laboratory at Wright-Patterson AFB, Ohio.

Command/Control/Communications PE 62702F (F1, Line 13)

This program element provides a broad technology base for advancing Air Force mission capabilities in command, control and communications. Six basic technology areas are pursued: surveillance;

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intelligence; communications and control; information sciences; electronic reliability and electromagnetic compatibility; and electromagnetic radiation, devices and components. The program element also provides for the operation and management of the Rome Air Development Center, Griffiss AFB, and the RADC Deputy for Electronic Technology, Hanscom AFB.

Very High-Speed Integrated Circuits PE 63452F (F2, Line 36)

Provides RDT&E funds for development and testing of very high-speed integrated circuit chips. Initial applications of these chips will be in digital signal processors for radar, antisubmarine warfare, communications, missile guidance, electronic warfare and optical sensor systems.

Advanced Concepts PE 63312F (F3, Line 50)

Limited access program.

Short-Range Attack Missile (SRAM) (AGM-69) PE 11118F (F4, Line 70)

The SRAM is a nuclear-armed, short-range, high-speed, air-to-ground stand-off missile.

Military Strategic Tactical and Relay System PE 33603F (F5, Line 92)

The MILSTAR Satellite Communications System will provide worldwide satellite communications for command and control of tactical and strategic forces of all services.

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<u>Next Generation Trainer Aircraft</u> PE 63228F (F5, Line 95)

Provides RDT&E funds for the continued development and testing of the airframe and engine of a next generation trainer, designed to modernize or replace the operationally deficient T-37 currently employed.

<u>Nuclear Weapons Support</u> PE 64222F (F4, Line 120)

Includes RDT&E funding to provide continuing support for activities that develop hardware associated with nuclear weapons (other than warheads) and activities that provide for safe and effective nuclear weapons delivery.

<u>Alternative Fighter Engine</u> PE 64223 (F6, Line 121)

Provides RDT&E funds for completion of testing and qualification of the F101 Derivative Fighter Engine under the Engine Model Derivative Program.

<u>Night Precision Attack</u> PE 64249 (F7, Line 124)

Provides RDT&E funds for flight testing and continued development of the Low-Altitude Navigation and Targeting Infrared System for Night (LANTIRN). This system will provide a capability for low-level precision attack and other than optimal weather conditions in air-to-surface interdiction and close air support missions.

<u>Aircraft Engine Component Improvement Program</u> PE 64268F (F7, Line 125)

Provides RDT&E funds for the continuation of aircraft engine component improvement programs. These programs are designed to reduce the costs of engine ownership and improve system operational

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readiness through improvements in durability, maintainability, operability, reliability, repairability, and suitability of the engine as operational conditions change and service time is accumulated.

Advanced Medium-Range Air-to-Air Missile PE 64314F (F7, Line 126)

Provides RDT&E funds to continue engineering design, development and fabrication of the Advanced Medium-Range Air-to-Air Missile. This is a joint Air Force/Navy program to develop an AIM-7/SPARROW follow-on air superiority air-to-air missile, compatible with the F-14, F-15, F-16, F-18, and appropriate NATO aircraft.

Conventional Stand-Off Weapon PE 64606 (F7, Line 132)

Provides the full-scale Engineering Development of an air-launched stand-off missile for employment from both tactical and strategic aircraft against a variety of key targets.

PAVE MOVER Engagement System PE 64616F (F7, Line 138)

Provides RDT&E funds for continued development of a conventional stand-off antiarmor warfare capability. System consists of ASSAULT BREAKER air-launched missiles and PAVE MOVER target acquisition and missile guidance commands.

Precision Location Strike System PE 64742F (F8, Line 150)

Program is designed to develop and test a tactical strike system primarily to suppress enemy air defenses.

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F-15 and F-16 Squadrons

F-15 PE 27130F (F8, Line 162)

F-16 PE 27133F (F8, Line 164)

Programs provide for engineering design and development of systems update as required. Continuing progrems include flight tests, management engineering support and systems integration.

Tactical Airborne Command Control Systems PE 27417F (F9, Line 173)

Program has as its main purpose the development and acquisition of an airborne surveillance system for command and control of tactical forces and strategic defense of the United States. Includes the manpower authorization, peculiar and support equipment, necessary facilities, and the associated costs specifically identified and attributable to the Airborne Warning and Control System (AWACS).

Advanced Communication System PE 27423 (F9, Line 174)

Provides RDT&E funds for modification engineering and continued integration engineering of SEEK TALK, HAVE QUICK and SINCGARS-V jam-resistant, advanced communications systems.

Space Communications PE 63431F (F10, Line 187)

Provides RDT&E funds for the only Air Force program for advanced development of satellite communications system concepts, techniques, and technologies. This program identifies, develops, demonstrates, evaluates, and operationalizes the technology necessary to support global command control and data relay communications that are survivable in electronic jamming and nuclear blackout environments.

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Special Activities PE 34111F (F10, Line 202)

Limited access program.

Space Test Program PE 63402F (F11, Line 208)

Program funds space flight for demonstrating new system design and concept and for determining environmental effects on military systems. The space test program is to be the pathfinder for exploiting the space shuttle as a manned space laboratory.

Space Shuttle PE 64411F (F11, Line 214)

Program has as its main objectives: (1) supporting NASA development and assuring the utility to DOD of the Space Transportation System; (2) transitioning critical national defense satellites to the space shuttle; (3) developing an inertial upper stage for use with the Space Shuttle; and (4) acquiring and operating general purpose space shuttle launch and landing facilities at Vandenberg AFB, California. RDT&E funds provide for the continued construction and activation of the Vandenberg launch and landing site.

Improved Capability for DT&E PE 64755F (F11, Line 218)

This program provides for the engineering, development, acquisition, and installation of significant new test range and instrumentation systems required for development, test, and evaluation. The new systems are required to obtain adequate capability to test and evaluate weapon and support systems currently in development.

Acquisition and Command Support PE 65806F (F11, Line 22[illegible]

Provides funding support for the Headquarters Air Force Systems Command, Aeronautical Systems Division, Electronic Systems Divisic Aerospace Medical Division, Space Division, Armament Division, and the Ballistic Missile Office.

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Test and Evaluation Support PE 65807F (F11, Line 229)

Provides funding support for operating five test activities within the Air Force Systems Command: (1) Arnold Engineering Development Center; (2) Armament and Development Test Center; (3) Air Force Flight Test Center; (4) 4950th Test Wing; and (5) Western Space and Missile Center.

Satellite Control Facility PE 35110F (F12, Line 229)

Provides funding support for the maintenance of a highly reliable national satellite tracking, telemetry, and commanding capability to support the development and operation of DOD satellite systems. The Air Force Satellite Control Facility consists of a global network which includes instrumentation systems, antennas, communications and data processing equipment required to support a growing inventory of increasingly complex space vehicles.

Consolidated Space Operation Center PE 35130F (F12, Line 231)

Provides funding for design of the simulator system and the integrated range control center for the Satellite Operations Complex and the Shuttle Operations and Planning Complex comprising the Consolidated Space Operation Center (CSOC). This CSOC is designed to provide a secure environment from which to conduct DOD space missions.

AIR FORCE (PROCUREMENT)

F-15 A/B/C/D/E (F2, Lines 8 & 9)

Provides for the procurement of F-15 aircraft, a twin-engine, swept-wing aircraft designed specifically for high maneuverability in air-to-air combat.

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F-16 A/B (F2 & 3, Lines 10 & 11)

Provides for the procurement of F-16 multipurpose single-seat, fixed-wing, high-performance fighter aircraft capable of performing a broad spectrum of tactical air warfare tasks.

KC-10A Advanced Tanker/Cargo Aircraft (F3, Lines 12 & 13)

Provides for the procurement of tanker/cargo aircraft. A derivative of the currently available wide-bodied DC-10 modified to provide a refueling capability and to exploit the cargo-carrying potential inherent in the existing aircraft design.

MC-130H (F3, Lines 14 & 15)

Provides for the procurement of airlift aircraft to satisfy recently revealed shortfalls in the size and capability of special operations forces.

Tactical Airborne Command and Control System (AWACS) E-3A (F3, Lines 16 & 17)

Provides for the procurement of E-3A (AWACS) aircraft. E-3A is a survivable airborne surveillance, command and control communications system which consists of special avionics and a large surveillance radar installed in a modified Boeing 707-320B airframe. Mission is to provide battle management in conducting air warfare in a tactical theater and strategic air defense.

C-5N (F3, Lines 18 & 19)

Provides for continued procurement of C-5 airlift aircraft. The C-5 provides rapid worldwide airlift of personnel and cargo in support of DOD and national missions, and is the only aircraft in the strategic mobility force capable of airlifting large "outsize" cargo.

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H/HH-60D Helicopter (F4, Lines 25 & 26)

Provides for the procurement of HH-60D BLACK HAWK helicopters. The HH-60D will be a derivative of the Army UH-60A and the Navy SH-60B incorporating improved avionics, extended range capability, more powerful engines and necessary mission equipment. The HH-60D will be used for combat rescue and special operations missions.

TR-1A (F4 & 5, Lines 26 & 27)

Provides for the procurement of TR-1A aircraft, a variant of the U-2R aircraft, to provide a high-altitude, stand-off battlefield surveillance/reconnaissance capability for theater/tactical commanders. Equipped with the latest electronic sensors being developed in other programs, the TR-1A will provide an effective battlefield surveillance system into the 1990s.

A-10 Modifications (F5, Line 34)

Provides for the continuation of A-10 update efforts. Program includes continuation of a turbine engine monitoring system and an inertial navigation system, and initiation of the SEEK TALK jam-resistant radio program and a tactical aircraft identification program.

F/RF-4 Modifications (F5, Line 35)

Provides for the continuation of previously initiated modifications and for the initiation of a performance update program, expanded data capability, conversion of additional F-4E aircraft to F-4G WILD WEASEL configuration, and the integration of the tactical aircraft identification system.

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(F5, Line 37)

F-15 Modifications

Program includes continuation of previously initiated modifications and initiation of an all-environment identification capability, a SEEK BANDIT capability and various reliability and maintainability modifications.

(F5, Line 37)

F-16 Modifications

Program continues the update of operational aircraft and initiates the Multinational Staged Improvement Program.

(F5, Line 39)

F-111 Modifications

Program provides for continuation of previously initiated modifications, e.g., secure voice capability, correction of avionic deficiencies, plus initiation of various reliability and safety modifications to the engine and airframe.

(F6, Line 43)

C-5 Modifications

Program completes procurement of the wing replacement modification and continues various reliability and safety improvements initiated in previous fiscal years.

(F6, Line 47)

C-130 Modifications

This program continues the wing modification and other efforts begun in previous fiscal years, e.g., various safety improvements, secure voice capability and a modification to conserve fuel.

(F6, Line 48)

C-135 Modifications

This program continues funding for modifications to maintain the reliability and extend the service life of the C-135 fleet and initiates a Diversity Reception Equipment Capability for the EC-135 command and control aircraft.

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E-3A (P6, Line 49)

Provides an airborne surveillance, command, control and communications system for use in both tactical and strategic defensive operations. This program includes the production of new aircraft, the continuation of ongoing modification programs begun in prior fiscal years, and the initiation of a SEEK TALK jam-resistant communications capability.

Other Aircraft Modifications (P6, Line 54)

This program continues funding for modifications initiated in previous years, and initiates a modification to provide a Chemical/Biological capability with hood blower equipment, and replacement of the navigation doppler on several helicopters with a reliable state-of-the-art doppler.

Classified Projects (Other Aircraft Modifications) (P6, Line 55)

Limited access program.

Civil Reserve Airlift Fleet (CRAF) (P6, Line 56)

Program funds incorporation of cargo convertibility features in US wide-body passenger aircraft during initial production or as a retrofit to enhance intertheater aircraft capability without increasing Air Force aircraft inventory.

Spares and Repair Parts (Aircraft) (P7, Line 57)

Program provides for the initial procurement of weapon system spares, modification spares and common usage spares.

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(F7, Line 58)

Common Ground Equipment

Program provides for the procurement of organizational base and depot level support equipment for out-of-production aircraft and for common support equipment for new aircraft entering the inventory.

(F7, Line 59)

Industrial Responsiveness

Program provides for capital-type rehabilitation of real property at Air Force-owned industrial facilities and finances preparation of government production equipment for shipment. Funds are used to bring Air Force plants to environmental standards, to reduce energy consumption, and for improvements of manufacturing methods.

(F7, Line 60)

War Consumables

Provides additional wartime support required in the event of hostilities to sustain operations until production can be expanded.

(F7, Line 61)

Other Production Charges

This program provides for items that are not directly related to specific aircraft procurement lines and cannot be reasonably allocated and charged thereto. It also includes items such as airborne electronic countermeasure pods that are used by more than one weapon system and managed as end items themselves.

NATO Airborne Warning and Control System (F7, Line 62)

This program provides the United States' share of acquisition, operation and support costs of the NATO AWACS program. This AWACS force will provide improved air defense and counter-air operations for NATO forces.

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AIM-7F/M SPARROW

(F10, Line 9)

Provides funds for procurement of SPARROW missiles. The SPARROW is a rocket-propelled, semi-active, radar-guidad, air-to-air missile. Provides US aircraft with an all-aspect capability under all-weather conditions against high performance air-to-air enemy aircraft.

AIM-9L/M SIDEWINDER

(F10, Line 10)

Provides for procurement of SIDEWINDER missiles. The SIDEWINDER is an infrared, short-range, air-to-air missile designed for visual attack. The missile is carried by both Navy and Air Force fighter and attack aircraft for use against all enemy aircraft.

AGM-65D MAVERICK

(F10, Line 11)

Provides for procurement of MAVERICK missiles. The MAVERICK missile is an air-to-ground systam which incorporates infrared technology to provide an effective day-night adverse-weather weapon system.

AGM-88A HARM

(F10, Line 12)

Provides for the initial procurement of HARM missiles for the Air Force. The HARM is an air-to-surface, antiradiation missile designed to damage or suppress radar-directed air defense weapons.

RAPIER

(F10, Line 13)

Continues procurement of the RAPIER air defense system. The RAPIER is a short-range, low-level, all-weather, ground-to-air missile systam. Produced in the United Kingdom, it will be used to defend United States air bases in the UK.

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AMRAAM (F10, Line 14)

Provides for advanced procurement of AMRAAM missiles. The AMRAAM is an air superiority air-to-air missile with significant improvements in operational utility and combat effectiveness over the SPARROW, and will provide an all-weather, all-aspect, beyond-visual-range air-to-air attack capability.

Class IV (F10, Line 16)

Program will provide for the continued procurement of modifications to improve reliability, maintainability, and extend service life of the AGM-45 SHRIKE, AIM-4 FALCON, LGM-30 MINUTEMAN and the Emergency Rocket Communications System. It will also continue modifications to the BQM-34 Target Drone and initiate modifications on the Air-Launched Cruise Missile as it enters the operational inventory.

Air-Launched Cruise Missile (Class V) (F10, Line 18)

Provides for the continued procurement of kits for retrofitting ALCMs with HAVE RUST electronic countermeasures.

Spares and Repair Parts (Missiles) (F11, line 21)

Provides for the procurement of initial and replenishment spares and repair parts for: ballistic missiles; other missiles; target drones; support, training, and replacement equipment; and spares for modification programs.

Space Launch Support (F11, Lines 24 & 25)

Provides for the procurement of Inertial Upper Stages and Payload Assist Modules to support operational launch requirements and for equipment spares for various tests.

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<u>Defense Satellite Communications System (DSCS)</u> (F12, Line 33)

Provides for procurement of initial launch vehicle integration and continuation of traveling wave tube emplifier improvements and shuttle compatability modifications in the DSCS. The DSCS provides Super High Frequency (SHF) satellite communications for secure voice and high data rate transmissions.

<u>Space Boosters</u> (F12, Lines 35 & 36)

Program provides an austere Expendable Launch Vehicle (ELV) backup for the launch of critical USAF operational payloads in the event that the space shuttle program is delayed or the orbiter fleet is grounded. These funds will be used to produce TITAN III D backup vehicles, and to support phase-out of production of certain TITAN III configurations after the last vehicle.

<u>Space Shuttle</u> (F12, Line 38)

Program funds procurement of an unmanned Inertial Upper Stage (IUS) for the space shuttle and construction of launch facilities and resources for ensuring that NASA facilities meet DOD security requirements. The IUS will be used by both DOD and NASA.

<u>Other Programs (Space Programs)</u> (F12, Line 40)

Limited access programs.

<u>Special Programs</u> (F12, Line 43)

Limited access programs.

<u>Special Update Programs</u> (F12, Line 44)

Limited access programs.

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(F15, Line 7)

20mm Training Cartridges

Provides for continued procurement of 20mm Training Cartridges.

(F15, Lines 8 & 9)

30mm Training/APT Cartridges

Provides for continued procurement of 30mm Training/API Cartridges designed for use on the A-10 aircraft. Used with the GAU8 gun system, the 30mm is effective against a broad spectrum of close air-support targets.

(F16, Line 25)

BSU-49 Inflatable Retarder

Provides for procurement of BSU-49 Inflatable Retarders designed to provide the USAF with the capability for low-level delivery of MK-82 500-pound general purpose bombs.

(F16, Line 28)

Laser Bomb Guidance Kit

Provides for continued procurement of Laser Bomb Guidance Kits. Kit consists of a field-installed computer control group and an airfoil group for the MK-82, 83 and 84 bombs. Control group detects laser energy reflected from a target illuminated by either a ground or airborne laser target designator and directs the laser-guided bomb on a line-of-sight trajectory to the target.

(F16, Line 29)

GBU-15

Provides for continued procurement of the GBU-15 Modular Guided Weapon System. The GBU-15 is a family of guidance, control, and airframe modules which, when combined with a warhead, can be configured as different weapons tailored for various attack and target configurations.

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CBU-89 (TMD/GATOR) (P16, Line 34)

Provides for continued procurement of the TMD/GATOR air-delivered, antiarmor/antivehicular mine system. The system is part of a Joint Service Antiarmor Development Program.

CBU-87 (Combined Effects Munitions) (P16, Line 35)

Provides for continued procurement of CBU-87 cluster munitions, The CEM is an air-delivered munition designed to replace the ROCKEYE antitank weapons and the CBU-58 type cluster bombs.

CBU-90 (ACM) (P16, Line 36)

Provides for continued procurement of CBU-90 antiarmor cluster munitions. The ACM is an air-delivered, antitank munition designed to provide a multitarget-per-pass kill capability for tactical fighter and attack aircraft.

M-206 Cartridge Flare (P17, Line 46)

Continued procurement of the M-206 cartridge flare, designed to provide self-protection for the HH-3, A-7 and A-10 aircraft against heat-seeking homing threats.

FMU-112/FMU-139 (P17, Line 56)

Provides for continued procurement of electronic impact or short delay fuzes designed to fit the standard 3-inch fuze well on bombs such as the M-117 and the MK-80 series. These fuzes are usable on both high- and low-speed aircraft.

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OTH-B Radar (F24, Line 169)

Provides for procurement of Over-The-Horizon Backscatter Radar designed to provide tactical early warning of hostile aircraft in the approaches to North America out to 1800 NM. This will allow detection of penetrating bombers beyond the range of their stand-off missiles and provide increased warning time.

SACDIN (F24, Line 170)

Provides for procurement of secure hard copy communication system hardware that will satisfy SAC command and control requirements and replace the existing data transmission system.

PAVE PAWS (F24, Line 172)

Provides for continued procurement of the US primary submarine-launched ballistic missile early warning system. The USAF operates sites on the east (Otis AFB) and west (Beale AFB) coasts.

Distant Early Warning Radar (F24, Line 178)

Provides for continued procurement of radars in a program designed to replace the current 31 radar sites with 11 minimally attended radars and 35 unattended short-range radars. This replacement will reduce operating costs and improve system performance.

TR-1 Ground Stations (F24, Line 180)

Provides for procurement of TR-1 Ground Stations designed to provide communications of near real-time intelligence and battlefield management information to tactical commanders in the Central European region.

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Automatic Data Processing Equipment (F24, Line 187)

Provides for continued procurement of installed computers and peripheral equipment necessary for the Air Force mission.

Air Base Defense System (F25, Line 192)

Program provides for increased security protection of alert aircraft and special weapon storage areas through continued procurement and deployment of physical security sensor systems.

Range Improvements (F25, Line 195)

Provides instrumentation and equipment necessary to support the operational range mission. The primary function of this improved capability is to provide more effective tests, evaluation and training capability.

Consolidated Space Operations Center (F25, Line 209)

Provides for procurement of equipment for the Shuttle Operations and Planning Center, Satellite Operations Center, and facility communications, designed to provide tracking, telemetry and commanding services to orbiting satellite systems and a control center for military space shuttle flights.

Joint Tactical Communications Program (TRI-TAC) (F26, Lines 215 & 216)

Program funds a joint service effort to develop and acquire tactical communications equipment, which can be commonly used in combat.

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(F26, Line 219)

AFSATCOM

Provides for procurement of terminals for MINUTEMAN launch control centers to enhance the reliability of communications, command and control.

(F26, Line 222)

Ground Mobile Force Terminal (GMFT)

Provides for continued procurement of terminals for both active and national guard tactical air forces, designed to provide highly reliable communications among Air Force Component Headquarters at tactical air bases and elements of the Tactical Air Control System.

(F26, Line 226)

Minimum Essential Emergency Communications Network

Initiates procurement of groundwave radio relay system designed to help provide reliable, secure, long-range command, control and communications for employment by US forces.

(F27, Line 235)

Spares and Repair Parts (Communications & Electronics)

Provides funds for initial and replenishment spares and repair parts for Air Force communications and electronic equipment.

(F27, Line 237)

Communications-Electronics Class IV Modifications

Provides for continued procurement of modifications to in-service systems and equipment.

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Medical/Dental Equipment (P29, Line 271)

Provides for replacement of equipment beyond economical repair; modernization of obsolete equipment; initial outfitting equipment for new, altered or expanded health care facilities; and procurement of war readiness equipment.

Mobility Equipment (P30, Line 287)

Provides for procurement of general purpose and expandable maintenance shelters, generators, aircraft arresting systems, rapid runway repair sets, portable hydrant refueling systems, housekeeping support, water purification sets, refrigerators and laundry equipment for the Rapid Deployment Force.

Selected Activities (P30, line 298)

Limited access activities.

Special Update Program (P30, Line 299)

Limited access program.

DEFENSE AGENCIES (RDT&E)

Defense Research Sciences PE 61101E (D1, Line 1)

A DARPA program to explore new materials, processing, structures, and devise concepts and demonstrate innovative solutions for overcoming materials-related limitations or barriers to advancement in the capability of advanced bearings; rapid-solidification technology; improved propulsion engines; structural and optical components for space laser, surveillance, and missile systems; electro-optical sensors; optical communication systems;

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high-performance microelectronic circuits; infrared imaging focal planes; and special devices and materials for DOD application.

Tactical Technology PE 62702E (D1, Line 5)

A DARPA program dedicated to the development of advanced tactical technologies and concepts that will serve as the basis for development of the next generation of tactical systems. Program goal is to advance nonnuclear, tactical, combat capabilities with careful consideration to realistic costs and service manpower constraints.

Integrated Command/Control Technology PE 62708E (D1, Line 7)

A DARPA program to develop advanced information processing, computer-communications and command system cybernetics technology which can provide the technology base for future command and control systems.

Nuclear Monitoring PE 62714E (D1, Line 10)

Program conducts research and development to provide new technological options for enhancing US capabilities for monitoring nuclear explosion events.

Defense Nuclear Agency PE 62715H (D1, Line 11)

Program provides for the development of nuclear weapons effects information necessary to evaluate survivability/vulnerability of United States military systems and understand/exploit weaknesses in enemy forces.

Cryptologic Activities PE 31011G (D2, Line 21)

Limited access program.

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Communication Security — PE 33401G (D2, Line 25)

Limited access program.

Defense Reconnaissance Support Activities — PE 35159I (D2, Line 27)

Limited access program.

Tactical Cryptological Activities — PE 35885G (D2, Line 29)

Limited access program.

Test and Evaluation (Director of Test and Evaluation) — PE 65804D (D5, Line 2)

Program provides for the conduct of independent test and evaluation activities in various tactical areas by the Director of T&E.

DEFENSE AGENCIES (PROCUREMENT)

Classified Equipment — (D2, Line 2)

Limited access program.

Items Less Than $900,000 Each (Major Equipment, DRSP) — (D4, Line 36)

Limited access program.

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DEPARTMENT OF ENERGY PROGRAMS

Activities related to these programs predominantly provide for normal maintenance and reliability assessment of the nuclear stockpile. None of these programs are judged to have a significant impact on arms control policy or negotiations.

W70, Mods 1 and 2 -- A nuclear warhead developed for the LANCE missile, a mobile, surface-to-surface ballistic missile system.

W69 -- A nuclear warhead deployed in the AGM-69A Short-Range Attack Missile (SRAM) which was developed as a defense-suppression and stand-off missile for carriage on the B-52 and FB-111 aircraft.

W68 -- The nuclear warhead for the MK-3 re-entry body which is carried on the POSEIDON Fleet Ballistic Missile. Each missile has the capability of independently targeting multiple warheads.

W62 -- A nuclear warhead deployed in a current MK-12 re-entry vehicle on the MINUTEMAN III missile. This system provides a multiple independently targetable re-entry vehicle (MIRV) capability.

B61, Mods 0, 1, 2, 3, 4, 5 -- A lightweight, multipurpose, multiyield, aircraft-delivered, nuclear gravity bomb.

B57 Bomb -- A lightweight, multipurpose, multiyield, nuclear depth charge or nuclear bomb.

W56-4 -- A nuclear warhead for the MK-11 re-entry vehicle carried on the MINUTEMAN II ballistic missile.

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W55 -- A nuclear warhead used with the Submarine Rocket (SUBROC), a rocket-propelled, nuclear depth bomb that is used against submarine targets.

B54 -- A nuclear warhead used in the Special Atomic Demolition Munition (SADM).

W53 -- A nuclear warhead used as the payload in the MK-6 re-entry vehicle for the TITAN II ICBM.

B53 -- A high yield nuclear gravity bomb designed to be delivered from a B-52 aircraft.

W50 -- A nuclear warhead used in MGM-31A and MGM-31B (PERSHING) field artillery missiles.

W48 -- A nuclear warhead for the 155mm artillery-fired atomic projectile (AFAP).

W45-1 -- A warhead which provides a nuclear capability for the Navy's TERRIER surface-to-air guided missile, designed as anti-aircraft armament for guided missile cruisers and some aircraft carriers.

W45-3,-4 -- A nuclear warhead used in the Medium Atomic Demolition Munition (MADM)

W44 Depth Charge -- A nuclear warhead used with the anti-submarine rocket (ASROC) missile, which provides surface combatant ships with a nuclear depth charge capability.

B43 -- A nuclear gravity bomb that can be delivered by most of the nuclear-capable strategic and tactical aircraft in the US inventory.

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W33 -- A nuclear warhead for the Army 8-inch AFAP.

W31 -- A nuclear warhead for both the HONEST JOHN free-flight surface-to-surface missile and the NIKE HERCULES surface-to-air guided missile.

B28 -- A nuclear gravity bomb that can be delivered by a variety of aircraft in the US inventory.

W25 -- The nuclear warhead for the AIR-2A (GENIE) unguided air-to-air rocket designed for use against enemy aircraft.

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APPENDIX

Glossary of Pertinent Terms and Acronyms

ABM SYSTEM: A system to counter strategic ballistic missiles or their elements in flight trajectory, currently consisting of: 1) ABM interceptor missiles, which are interceptor missiles constructed and deployed for an ABM role, or of a type tested in an ABM mode; 2) ABM launchers, which are launchers constructed for launching ABM interceptor missiles; 3) ABM radars, which are radars constructed and deployed for an ABM role, or of a type tested in an ABM mode.

ABM TREATY: This Treaty is one of the two agreements signed at Moscow on May 26, 1972, known collectively as the SALT I agreements. The original ABM Treaty limited each side to two ABM deployment areas (one national capital area and one ICBM silo launcher area) with restrictions on the deployment of ABM launchers and interceptors (100 of each per area) and ABM radars at these areas. A protocol to the Treaty signed in 1974 further restricted each side to only one ABM deployment area.

ACCIDENTAL ATTACK: An unintended attack which occurs without deliberate national design as a direct result of a random event, such as a mechanical failure, a simple human error, or an unauthorized action by a subordinate.

ACCIDENTAL WAR: See ACCIDENTAL ATTACK.

ACCURACY OF FIRE: The measure of the deviation of fire from the aim point, expressed in terms of distance between the point of aim and the mean point of bursts.

ACTIVE DEFENSE: The employment of limited offensive action and counterattacks to deny a contested area or position of the enemy. (see also PASSIVE DEFENSE).

ACUTE DOSE: Total dose of radiation received at one time over a period so short that biological recovery cannot occur.

ACTIVE ELECTRONIC COUNTERMEASURES: ECM which involve active emissions which may be detected by an enemy such as jamming (the deliberate radiating or re-radiating of electronic signals in order to obliterate or obscure signals the enemy is attempting to receive) or deception (the deliberate radiating or re-radiating of electronic signals to mislead the enemy in his interpretation of signals received by his electronic equipment).

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AEROSPACE: Of, or pertaining to, the earth's envelope of atmosphere and the space above it; two separate entities considered as a single realm for activity in launching, guidance and control of vehicles which will travel in both entities.

AEROSPACE DEFENSE: All defensive measures designed to destroy attacking enemy aircraft, missiles and space vehicles after they leave the earth's surface, or to nullify or reduce the effectiveness of such attacks; an inclusive term encompassing air defense and space defense.

AGGREGATE: The SALT II Agreement provides for several "aggregate" numerical limits on various categories of strategic offensive arms. The term "aggregate" refers principally to the overall aggregate of ICBM launchers, SLBM launchers, heavy bombers and ASBM's.

AIRBORNE ALERT: A state of aircraft readiness wherein combat equipped aircraft are airborne and ready for immediate action. It is designed to reduce reaction time and to increase the survivability factor.

AIR-BREATHING of MISSILE: A missile with an engine requiring the intake of air for combustion of its fuel, as in a ramjet or turbojet (To be contrasted with the rocket - powered missile, which carries its own oxidizer and can operate beyond the atmosphere).

AIRBURST: An explosion of a bomb or projectile above the surface as distinguished from an explosion on contact with the surface or after penetration.

AIR DEFENSE: All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack.

AIRLIFT: The total weight of personnel and/or cargo that is, or can be carried by air, or that is offered for carriage by air. 2) to transport passengers and cargo by use of aircraft. (see also PAYLOAD)

AIR PORTABLE: Denotes material which is suitable for transport by an aircraft loaded internally or externally with no more than minor dismantling and reassembling within the capabilities of user units. This term must be qualified to show the extent of air portability.

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AIR SUPERIORITY:	That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force.
AIR-TO-AIR MISSILE:	A missile launched from an airborne carrier at a target above the surface.
AIR-TO-SURFACE MISSILE:	A missile launched from an airborne carrier to impact on a surface target.
ALERT:	1) Readiness for action, defense or protection. 2) A warning signal of a real or threatened danger, such as an air attack. 3) the period of time during which troops stand by in response to an alarm. 4) to forewarn; to prepare for action. (see also GROUND ALERT).
ALLOCATION:	The designation of specific numbers and types of aircraft sorties for use during a specified time period or for carrying out an assigned task. Allocation (nuclear): the apportionment of specific numbers and types of nuclear weapons to a commander for a stated time period as a planning factor for use in the development of war plans.
ANTI-RADIATION MISSILES:	A missile which homes passively on a radiation source.
ANTI-SUBMARINE WARFARE:	Operations conducted with the intention of denying the enemy the effective use of his submarines.
APOGEE:	The point at which a missile trajectory or a satellite orbit is farthest from the center of the gravitational field of the controlling body or bodies.
AREA DEFENSE:	Defense of a wide geographical area against missiles and aircraft.
AREA TARGET:	A target consisting of an area rather than a single point.
ARMING:	As applied to explosives, the changing from a safe condition to a state of readiness for initiation. As applied to weapons and ammunition, the changing from a safe condition to a state of readiness for initiation.

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ARMORED PERSONNEL CARRIER:	A lightly armored, highly mobile, full tracked vehicle, amphibious and airdropable, used primarily for transporting personnel and their individual equipment during tactical operations. Production modifications or application of special kits permit use as a mortar carrier, command post, flame thrower, antiaircraft artillery chassis, or limited recovery vehicle.
ARMOR PIERCING (CAPPED):	Term applied to armour piercing projectiles which have a face hardened steel cap over the head.
ARMS CONTROL:	A concept which connotes: a) any plan, arrangement, or process, resting upon explicit or implicit international agreement, governing any aspect of the following: the numbers, types and performance characteristics of weapon systems (including their command and control, logistics support arrangements, and any related intelligence gathering mechanisms); and the numerical strength organization, equipment, deployment or employment of the armed forces retained by the parties. It encompasses "disarmament." b. On some occasions those measures taken for the purpose of reducing instability in the military environment.
ARMS STABILITY:	The condition of greater predictability and restraint which lessens the incentives for reactive force buildups.
ASSEMBLY AREA:	1). An area in which a command is assembled preparatory to further action. 2) In a supply installation, the gross area used for collection and combining components into complete units, kits or assemblies.
ASSURED DESTRUCTION:	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike.
ATTENUATION:	Decrease in intensity of a signal, beam, or wave as a result of absorption of energy and of scattering out of the path of a detector, but not including the reduction due to geometric spreading, i.e., the inverse square of distance effect. 2) In mine warfare, the reduction in intensity of an influence as distance from the source increases.
AVIONICS:	The application of electronics to aviation and astronautics.
AZIMUTH:	A direction expressed as a horizontal clockwise angle

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in degrees or mils measured from north. Azimuth resolution is the ability of radar equipment to separate two reflectors at similar ranges but different bearings from a vehicle. Normally the minimum separation distance between the reflectors is quoted and expressed as the angle subtended by the reflectors at the vehicle.

BACK-SCATTER/ BACKSCATTERING: Radiowave propagation in which the direction of the incident and scattered waves, resolved along a reference direction (usually horizontal), are oppositely directed. A signal received by backscattering is often referred to as backscatter.

BALLISTIC MISSILE: Any missile designed to follow the trajectory that results when it is acted upon predominantly by gravity and aerodynamic drag after thrust is terminated. Ballistic missiles typically operate outside the atmosphere for a substantial portion of their flight path and are unpowered during most of the flight. (see also INTERCONTINENTAL BALLISTIC MISSILE.

BALLISTIC TRAJECTORY: The trajectory traced after the propulsive force is terminated and the body is acted upon only by gravity and aerodynamic drag.

BARRIER: A coordinated series of obstacles designed or employed to canalize, direct, restrict, delay or stop the movement of an opposing force, and to impose additional losses in personnel, time and equipment on the opposing force.

BASE: (air, land, sea, space). 1) A locality from which operations are projected or supported. 2) An area or locality containing installations which provide logistic or other support.

BATTLEFIELD SURVEILLANCE: The continuous (all weather, day and night) systematic watch over the battle area to provide timely information for combat intelligence.

BEAM RIDER/ RIDING: 1. A missile guided by a radar, radio, or laser beam. 2. A missile guided by an electronic beam.

BILATERAL NEGOTIATION: Negotiations between two countries.

BINARY NERVE GAS: A process which provides for the formation of a lethal chemical agent from two non-lethal constituents by means of a chemical reaction occurring only during flight of the munition to a target. Additional safety and security are achieved by adding the second constituent at the time of preparing the munition for use.

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BIOLOGICAL WARFARE: Employment of living organisms, toxic biological products and plant growth regulators to produce death or casualties in man, animals or plants; or defense against such action.

BLAST: The brief and rapid movement of air vapor of fluid away from a center of outward pressure, as in an explosion or in the combustion of rocket fuel; the pressuro accompanying this movement. This term is commonly used for "explosion," but the two terms may be distinguished.

BOMB DAMAGE ASSESSMENT: The determination of the effect of all air attacks on targets (e.g., bombs, rockets, or strafe).

BOMBER (Light, Medium, Heavy): 1) Light: A bomber designed for a tactical operating radius of under 1,000 nautical miles at design gross weight and design bomb load. 2) Heavy: A bomber designed for a tactical operating radius over 2,500 nautical miles at design gross weight and design bomb load. 3) Medium: A bomber designed for a tactical operating radius of between 1,000 and 2,500 nautical miles at design gross weight and design bomb load.

BOOSTER: 1) A high explosive element sufficiently sensitive so as to be actuated by small explosive elements in a fuse or primer and powerful enough to cause detonation of the main explosive filling. 2) An auxiliary or initial propulsion system which travels with a missile or aircraft and which may or may not be separate from the parent craft when its impulse has been delivered. A booster system may contain or consist of one or more units.

BURNOUT: The point in time or in the missile trajectory when combustion of fuels in the rocket engine is terminated by other than programmed cutoff.

CARRIER (Carrier Striking Force): A naval task force composed of aircraft carriers and supporting combatant ships capable of conducting strike operations.

CENTRAL SYSTEM: Offensive strategic nuclear weapons systems which the US considers central to the strategic nuclear relationship between the US and USSR (currently consisting of ICBMs, SLBMs, and heavy bombers).

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CHEMICAL AGENT: A solid, liquid, or gas which, through its chemical properties, produces lethal or damaging effects on man, animals, plants or material, or produces a screening or signaling smoke.

CHEMICAL DEFENSE: The methods, plans and procedures involved in establishing and executing defensive measures against attack by chemical agents.

CHEMICAL WARFARE (OPERATIONS): Employment of chemical agents (excluding riot agents) to: a) kill, or incapacitate for a significant period of time, man or animals; and b) deny or hinder the use of areas, facilities, or material.

CHRONIC DOSE Radiation dose absorbed in circumstances such that biological recovery may have been possible. It is arbitrarily accepted that a chronic dose can only mean absorption occurring after 24 hrs following the burst. (See also ACUTE DOSE).

CIRCULAR ERROR PROBABLE: A measure of the delivery accuracy of a weapon system. It is the radius of a circle around a target of such size that a weapon aimed at the target has a 50% probability of falling within the circle.

CLEAN WEAPON: A nuclear weapon in which measures have been taken to reduce the amount of residual radioactivity relative to a "normal" weapon of the same energy yield.

CLOSE AIR SUPPORT: Air attacks against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces.

CLUSTER MUNITION: 1. Groups of bombs released together. A cluster usually consists of fragmentation or incendiary bombs. 2. (land mine warfare)-Component of a pattern laid minefield. It may be antitank, antipersonnel, or mixed. It consists of one to five mines and no more than one antitank mine.

COLD LAUNCH: The technique of ejecting a missile from a silo before full ignition of the main engine, sometimes called "Pop-up."

COLD WAR: A state of international tension, wherein political, economic, technological, sociological, psychological, paramilitary, and military measures short of overt armed conflict involving regular military forces are employed to achieve national objectives.

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COLLATERAL CASUALATIES & DAMAGE: The damage to surrounding human and non-human resources either military or non-military, as the result of action or strikes directed specifically against enemy forces or military facilities.

COMMAND, CONTROL, COMMUNICATIONS: The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of his mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures which are employed by a commander in planning, directing, cordinating and controlling forces and operations in the accomplishment of his mission.

COMMUNICATIONS SATELLITE: An orbiting vehicle, which relays signals between communications stations. They are of two types: a. active communications satellite - A satellite which receives, regenerates, and retransmits signals between stations; and b. passive communications satellite - A satellite which reflects communications signals between stations.

CONTAMINATION: The deposit and/or absorption of radioactive material, biological warfare agents or chemical warfare agents on and by structures, areas, personnel or objects.

CONTOUR FLYING: Flight at low altitude in which the flight pattern conforms generally to the contours of the area. It is used to avoid observation or detection of an aircraft and/or the points to and from which it is flying.

CONTROLLED RESPONSE: The selection from a wide variety of feasible options of the one which will provide the specific military response most advantageous in the circumstances.

CONVENTIONAL WEAPON: Nonnuclear weapons. Excludes all biological weapons, and generally excludes chemical weapons except for existing smoke and incandiary agents, and agents of the riot control type.

COOPERATIVE MEASURES: Measures taken by one side in order to enhance the other side's ability to verify compliance with the provisions of the agreement. Such measures can be voluntary or negotiated.

COUNTERFORCE: The employment of strategic air and missile forces in an effort to destroy, or render impotent, selected military capabilities of an enemy force under any of the circumstances by which hostilities may be initiated.

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COUPLING (STRATEGIC): The linking of a lower level conflict, e.g., Soviet/Warsaw Pact military aggression in Europe, to the use of US strategic deterrent forces such as ICBMs, heavy bombers and SLBMs.

CRISIS STABILITY: A strategic force relationship in which neither side has any incentive to initiate the use of strategic nuclear forces in a crisis situation.

CRUISE MISSILE: A guided missile which uses aerodynamic lift to offset gravity and propulsion to counteract drag. A cruise missile's flight path remains within the Earth's atmosphere.

CRUISE MISSILE CARRIER: An aircraft equipped for launching a cruise missile.

DAMAGE ASSESSMENT: 1) The determination of the effect of attacks on targets. 2) A determination of the effect of a compromise of classified information on the national security. 3) The appraisal of the effects of attacks on targets.

DATA LINK, RELAYS: A communications link whose terminals are suitable for transmission of data.

DECONTAMINATION: The process of making any person, object or area safe by absorbing, destroying, neutralizing, making harmless, or removing, chemical or biological agents, or by removing radioactive material clinging to or around it.

DECOY: A model, electromagnetic reflector or other device accompanying a nuclear weapon delivery vehicle in order to mislead enemy defensive systems so as to increase the probability of penetration and weapon delivery.

DEFENSE-IN-DEPTH: The siting of mutually supporting defense positions designed to absorb and progressively weaken attack, prevent initial observations of the whole position by the enemy and to allow the commander to maneuver his reserve.

DELIBERATE CONCEALMENT: Measures carried out deliberately to hinder or deliberately to impede verification of compliance with the provisions of the treaty. Deliberate concealment measures could include for example, camouflage, use of coverings, or deliberate denial of telemetric information, such as through the use of telemetry encryption, whenever such measures impede verification of compliance with the provisions of the agreement.

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DEMILITARIZED ZONE: A defined area in which the stationing or concentrating of military forces, or the retention or establishment of military installation of any description, is prohibited.

DEPLOYMENT: 1) The extension or widening of the front of a military unit, extending from a close order to a battle formation. 2) In naval usage, the change from a cruising, approach or contact disposition to a disposition for battle. 3) In a strategic sense, the relocation of forces to desired areas of operation.

DEPRESSED TRAJECTORY: The trajectory of a ballistic missile fired at an angle to the ground significantly lower than the angle of a minimum energy trajectory. Such a missile rises above the line-of-sight radar horizon at a later state of flight and has a shorter time of flight, thus making detection and tracking more difficult and reducing warning time.

DETERRENCE: The prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction.

DOPPLER RADAR: A radar system which differentiates between fixed and moving targets by detecting the apparent change in frequency of the reflected wave due to motion of target or the observer.

DRONE: A land, sea or air vehicle which is remotely or automatically controlled.

DUAL-CAPABLE WEAPONS: 1) Weapons, weapons systems or vehicles capable of selective equipage with different types or mixes of armament or firepower. 2) Sometimes restricted to weapons capable of handling either nuclear or nonnuclear munitions.

DUAL-MISSION (PURPOSE) WEAPONS: Weapons which possess the capability for effective application in two or more basically different military functions and/or levels of conflict.

EARLY WARNING: Early notification of the launch, or approach, of unknown weapons or weapons carriers.

EARMARKED FOR ASSIGNMENT: Forces which nations have agreed to assign to the operational command or operational control of a NATO/CENTO commander at some future date. In designating such forces, nations should specify when these forces will be available in terms agreed to in the echelon or category systems.

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ELECTROMAGNETIC PULSE: The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device in a surrounding medium. The resulting electric and magnetic fields may couple with military systems to produce damaging current and voltage source.

ELECTRO-OPTICS: The interaction between optics and electronics leading to the transformation of electrical energy into light, or vice versa, with the use of an optical device.

ELECTRONIC COUNTERMEASURES: That major subdivision of electronic warfare involving actions taken to prevent or reduce the effectiveness of enemy equipment and tactics employing or affected by electromagnetic radiations and to exploit the enemy's use of such radiations.

ELECTRONIC WARFARE: That division of the military use of electronics involving actions taken to prevent or reduce an enemy's effective use of radiated electromagnetic energy, and actions taken to insure our own effective use of radiated electromagnetic energy.

ELECTRONIC JAMMING: The deliberate radiation, reradiation or reflection of electromagnetic energy with the object of impairing the use of electronic devices, equipment or systems being used by an enemy.

ENCRYPTION: Encryption is encoding communications for the purpose of concealing information. In SALT II, this term has been applied to a practice whereby a side alters the manner by which it transmits telemetry from a weapon being tested rendering the information deliberately undecipherable.

ENDOATMOSPHERE: From sea level to about 48 nautical miles altitude.

EQUIVALENT MEGATONNAGE: A measure used to compare the destructive potential of differing combinations of nuclear warhead yield against relatively soft countervalue targets. EMT is computed from the expression: $EMT=NY^{x}$, where N = number of actual warheads of yield Y; Y = yield of the actual warheads in megatons; and x = scaling

ESCALATION: An increase in scope or violence of a conflict, deliberate or unpremeditated.

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ESSENTIAL EQUIVALENCE:	The term as currently used refers to approximate equality in the overall strategic capabilities of the two sides' central systems.
EXOATMOSPHERE:	Higher than about 40 nautical miles above sea level.
EXPOSURE DOSE:	The exposure dose at a given point is a measurement of radiation in relation to its ability to produce ionization.
EXTERNALLY OBSERVABLE DIFFERENCES	Externally observable design features used to distinguish between those heavy bombers of current types [and air-launched cruise missiles] which are capable of performing a particular SALT-limited function and those which are not. These differences need not be functionally related but must be a physical design feature which is externally observable.
FALLOUT:	The precipitation to earth or radioactive particulate matter from a nuclear cloud; also applied to the particular matter itself.
FIREBALL:	The luminous sphere of hot gases which forms a few millionths of a second after detonation of a nuclear weapon and immediately starts expanding and cooling.
FIRE CONTROL:	All operations connected with the planning, preparation, and actual application of fire on a target.
FIRE CONTROL SYSTEM:	Group of interrelated fire control equipment and/or instruments designed for use with a weapon or group of identical weapons.
FIREPOWER:	The amount of fire which may be delivered by a position, unit or weapon system.
FIRST STRIKE:	The first offensive move of a war. (Generally associated with nuclear operations).
FISSION:	The process whereby the nucleus of a particular heavy element splits into (generally) two nuclei of lighter elements, with the release of substantial amounts of energy.
FIXED LAUNCHER: (ICBM):	There are two categories of ICBM launchers - fixed and mobile. Fixed ICBM launchers have traditionally been referred to as either "soft," whereby the missile and most of its launch equipment remain above ground, or "hard," whereby the missile and most of its launch

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equipment are contained in a hardened underground silo. In both cases the launcher - the equipment which launches the missile - is in a fixed location.

FLEXIBLE RESPONSE: The capability of military forces for effective reaction to any enemy threat or attack with actions appropriate and adaptable to the circumstances existing.

FOCAL PLANE: The plane, perpendicular to the optical axis of the lens, in which images of points in the object field of the lens are focused.

FORWARD BASED SYSTEMS: A term introduced by the USSR to refer to those US nuclear systems based in third countries or on aircraft carriers and capable of delivering a nuclear strike against the territory of the USSR.

FORWARD DEFENSE POSITION: In the mobile defense, any combination of islands of resistance, strong points, and observation posts utilized by the defender to warn of impending attack, canalize the attacking forces into less favorable terrain and block or impede the attacking force. Forward defense positions are occupied by the minimum forces necessary while the bulk of the defending force is employed in offensive action.

FORWARD EDGE OF THE BATTLE AREA: (FEBA) The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating, designated to coordinate fire support, the positioning of forces or the maneuver of units.

FRACTIONAL ORBITAL BOMBARDMENT SYSTEM: A missile that achieves an orbital trajectory, but fires a set of retro-rockets before the completion of one revolution in order to slow down, reenter the atmosphere and release the warhead it carries into a normal ballistic trajectory toward its target. While a normal ICBM follows a parabolic path to target, highly visible to defending radars, a weapon in low orbit, e.g., 100 miles, can make a sharp descent to earth, cutting radar warning time substantially. A FOBS path accordingly consists of a launch into low orbit, a partial circle to the earth target, and a rapid descent.

FRACTIONATION: The division of the payload of a missile into several warheads. The use of a MIRV payload is an example of fractionation.

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FUEL EXHAUSTION RANGE: The total store of fuel assumed to be burned and no fuel reserve held back. Fuel exhaustion range is the range definition for cruise missiles in the SALT II Treaty.

FUNCTIONALLY RELATED OBSERVABLE DIFFERENCES: (FRODs) The means by which SALT II provides for distinguishing between those aircraft which are capable of performing certain SALT-limited functions and those which are not. FRODs are differences in the observable features of airplanes which specifically determine whether or not these airplanes can perform the mission of a heavy bomber or whether or not they can perform the mission of a bomber equipped for cruise missiles of a range in excess of 600 km, or whether or not they can perform the mission of a bomber equipped for ASBMs.

FUSION: The process accompanied by the release of tremendous amounts of energy, whereby the nuclei of light elements combine to form the nucleus of a heavier element.

GENERAL WAR: Armed conflict between major powers in which the total resources of the belligerents are employed, and the national survival of a major belligerent is in jeopardy.

GLIDE BOMB: A bomb fitted with air foils to provide lift, carried and released in the direction of a target by an airplane.

GROUND ALERT: That status in which aircraft on the ground/deck are fully serviced and armed, with combat crews in readiness to take off within a specified short period of time (usually 15 minutes) after receipt of a mission order.

GROUND SUPPORT: See CLOSE AIR SUPPORT.

GROUND ZERO: The point on the surface of the earth at, or vertically below or above, the center of a planned or actual nuclear detonation. Also called GZ.

GUIDANCE: The entire process by which target intelligence information received by the guided missile is used to effect proper flight control to cause timely direction changes for effective target interception.

GUIDED MISSILE: An unmanned vehicle moving above the surface of the earth, whose trajectory or flight path is capable of being altered by an external or internal mechanism.

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HALF-LIFE: The time required for the activity of a given radioactive species to decrease to half of its initial value due to radioactive decay. The half-life is a characteristic property of each radioactive species and is independent of its amount or condition.

HARDENED SITE: A site constructed to withstand the blast and associated effects of a nuclear attack and likely to be protected against a chemical, biological, or radiological attack.

HEAVY BALLISTIC MISSILE: For the purpose of SALT II, ballistic missiles are divided into two categories according to their throw-weight and launch-weight: light and heavy. Heavy missiles (ICBM's, SLBM's, and ASBM's) are these missiles which have a launch-weight greater or a throw-weight greater than the launch-weight or throw-weight of the Soviet SS-19 ICBM.

HEIGHT OF BURST: 1) The vertical distance from the earth's surface or target to the point of burst. 2) For nuclear weapons, the optimum height of burst for a particular target (or area) is that at which it is estimated a weapon of a specific energy yield will produce a certain desired effect over the maximum possible area.

HIGH EXPLOSIVE: Generally applied to the bursting charges for bombs, projectiles, grenades, mines and demolition charges.

HOMING: The technique of tracking along a position line towards the point of origin of a radio, radar or other navigation aid.

HOMING GUIDANCE: A system by which a missile steers itself toward a target by means of a self-contained mechanism which is activated by some distinguishing characteristics of the target.

HOMING OVERLAY EXPERIMENT: (HOE) The HOE is designed to demonstrate the ability of optics to acquire targets in flight; isolate RVs from accompanying chaff, penetration aids, and booster fragments; and guide the missile to intercept with a goal of a miss distance small enough to permit RV destruction by other than nuclear means. HOE would demonstrate the capability and illustrate the advantages of exoatmosphere, non-nuclear intercept at relatively long ranges.

HOWITZER: A cannon which combines certain characteristics of guns and mortars. The howitzer delivers projectiles with medium velocities, either by low or high trajectories.

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HYPERGOBIC FUEL: Fuel which will spontaneously ignite with an oxidizer, such as aniline with fuming nitric acid. It is used as the propulsion agent in certain missile systems.

ICBM SILO LAUNCHER: An ICBM silo launcher, a "hard" fixed ICBM launcher, is an underground installation, constructed primarily of steel and concrete, housing an intercontinental ballistic missile and the equipment for launching it.

INDISCRIMINATE USE: The placement of a munition which a) is not on, or directed against, a military objective; b) employs a method or means of delivery which cannot be directed at a specific military objective; or c) may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.

INDUCED RADIATION: Radiation produced as a result of exposure to radioactive material, particularly the capture of neutrons.

INERTIAL CONFINEMENT: A concept for attaining the density and temperature condition that will produce nuclear fusion by use of lasers or other high power sources to compress and heat small pellets containing fusionable fuel. The energy released is in the form of fast neutrons, X-rays, charged particles, and debris, and can be used in much the same way as the energy output of any other fusion (or fission) process.

INERTIAL GUIDANCE: A guidance system designed to project a missile over a predetermined path, wherein the path of the missile is adjusted after launch by devices wholly within the missile and independent of outside information. The system measures and converts accelerations experienced to distance traveled in a certain direction.

INERTIAL NAVIGATION SYSTEM: A guidance system designed to project a missile to a predetermined point on the earth's surfce by measuring acceleration and noting changes in any one direction. The system is insensitive to jamming, atmospheric conditions in the launcher area and other forms of interference.

INITIAL OPERATIONAL CAPABILITY: (IOC) The date when the first combat missile unit is equipped, trained and logistic support established to permit performance of combat missions in the field. An initial operational capability date is associated with each new missile system as a target date for delivery of combat equipment, repair parts, maintenance equipment and publications plus supply of trained personnel.

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INITIAL RADIATION: The radiation, essentially neutrons and gamma rays resulting from a nuclear burst and emitted from the fireball within one minute after burst.

INSPECTION: In arms control, the physical process of determining compliance with arms control measures.

INTERCEPTOR: A manned aircraft utilized for identification and/or engagement of airborne objects.

INTERCONTINENTAL BALLISTIC MISSILE: (ICBM) A land-based fixed or mobile rocket-propelled vehicle capable of delivering a warhead to intercontinental ranges. Once they are outside the atmosphere, ICBMs fly to a target on an elliptical trajectory. An ICBM consists of a booster, one or more reentry vehicles, possibly penetration aids, and, in the case of a MIRV'ed missile, a post-boost vehicle. For the purposes of SALT II, an ICBM is considered to be a land-based ballistic missile capable of a ballistic missile capable of a range in excess of 5,500 km (about 3,000 nautical miles).

INTERDICT: To prevent or hinder, by any means, enemy use of a route or area.

INTERFERENCE: The SALT II treaty provides that each party shall use national technical means (NTM) of verification at its disposal to provide assurance of compliance with the treaty. In this connection, each party has undertaken a commitment not to interfere with the NTM of the other party. This means that neither side can destroy or attempt to negate the functioning of the NTM of the other side (e.g., blinding of photoreconnaissance satellites).

INTERMEDIATE RANGE BALLISTIC MISSILE: A ballistic missile, with a range capability from about 1,500 to 3,000 nautical miles. See ICBM.

KILL PROBABLE (PROBABILITY): A measure of the probability of destroying a target.

KILOTON WEAPON: A nuclear weapon, the yield of which is measured in terms of thousands of tons of trinitrotoluene explosive equivalents, producing yields from 1 to 199 kilotons.

LAUNCH: Transition from static repose to dynamic flight of a missile. For the purpose of SALT II, a launch includes a flight of a missile for testing, training, or any other purpose. The term "launch" would not encompass so-called pop-up tests which are tests of the launcher and ejection mechanism.

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LAUNCHER:	That equipment which launches a missile. ICBM launchers are land-based launchers which can be either fixed or mobile. SLBM launchers are the missile tubes on a ballistic missile submarine. An ASBM launcher is the carrier aircraft with associated equipment launchers for cruise missiles can be installed on aircraft, ships, or land-based vehicles or installations.
LAUNCHING SITE:	Any site or installation with the capability of launching missiles from surface-to-air or surface-to-surface.
LAUNCH-ON-WARNING:	A doctrine calling for the launch of ballistic missiles when a missile attack against them is detected and before the attacking warheads reach their targets.
LAUNCH PAD:	A concrete or other hard surface area on which a missile launcher is positioned.
LAUNCH WEIGHT:	The weight of the fully loaded missile itself at the time of launch. This would include the aggregate postboost vehicle (PBV) and the payload.
LIGHT (BALLISTIC MISSILE):	For the purposes of SALT II, ballistic missile are divided into two categories according to their throw-weight and launch-weight: light and heavy. The Soviet SS-19 ICBM is acknowledged by both sides as the heaviest of the existing light ICBM's on either side.
LINES OF COMMUNICATION:	All the routes, land, water, and air, which connect an operating military force with a base of operations and along which supplies and military forces move.
LOCK-ON:	Signifies that a tracking or target seeking system is continuously and automatically tracking a target in one or more coordinates (e.g., range, bearing, elevation).
LOGISTICS:	The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with: a. design and development, acquisition, storege, movement, distribution, maintenance, evacuation and disposition of materiel; b. movement, evacuation and hospitalization of personnel; c. acquisition or construction, maintenance, operation and disposition of facilities; and d. acquisition or furnishing of services.
MACH NUMBER:	The ratio of the velocity of a body to that of sound in the surrounding medium.

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MANEUVERABLE REENTRY VEHICLE: A reentry vehicle capable of performing preplanned flight maneuvers during the reentry phase.

MAXIMUM RANGE: The greatest distance a weapon can fire without consideration of dispersion, or the greatest distance a weapon system can fly.

MEDIAN LETHAL DOSE: 1. (Nuclear) The amount of radiation over the whole body which would be fatal to 50 percent of the animals or organisms in question in a given period of time. 2. (Chemical). The dose of toxic chemical agent which will kill 50 percent of exposed unprotected personnel. It is expressed in milligram minutes per cubic centimeter.

MEDIUM-RANGE BALLISTIC MISSILE: A ballistic missile with a range capability from about 600 to 1,500 nautical miles.

MEGATON: A unit of measurement for nuclear yield equivalent to the energy released from one million tons of TNT.

MIDCOURSE GUIDANCE: The guidance applied to a missile between termination of the launching phase and the start of the terminal phase of flight.

MOBILE (ICBM) LAUNCHER: Equipment which launches an ICBM and which can move or be moved from one location to another. Mobile ICBM launchers could include ICBM launchers on wheeled vehicles, launchers on vehicles which travel on rails, and launchers which are moved among launch-points which might themselves be "hard" or "soft."

MOBILITY: A quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission.

MULTILATERAL NEGOTIATIONS: Negotiations between more than two countries.

MULTIPLE INDEPENDENTLY-TARGETABLE REENTRY VEHICLE (MIRV) Multiple reentry vehicles carried by a ballistic missile, each of which can be directed to a separate and arbitrarily located target. A MIRV'ed missile employs a post-boost vehicle (PBV) or other warhead dispensing mechanism. The dispensing and targeting mechanism maneuvers to achieve successive desired position and velocities to dispense each RV on a trajectory to attack the desired target, or the RV's might themselves maneuver toward their targets after they reenter the atmosphere.

MULTIPLE REENTRY VEHICLE: The reentry vehicle of a ballistic missile equipped with multiple warheads where the missile does not have the capability of independently targeting the reentry vehicles - as distinct from a missile equipped for MIRV's.

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MUTUAL ASSURED DESTRUCTION: (MAD)	The ability to inflict an "unacceptable" degree of damage upon an aggressor after absorbing any first strike. MAD is a condition in which assured destruction capability is possessed by opposing sides.
MUTUAL BALANCED FORCE REDUCTIONS:	An on-going negotiation between NATO/Warsaw Pact countries on the reduction and limitation of military forces in central Europe. As presently structured, phase One of a negotiated agreement would involves force reductions between the US and USSR; Phase Two would involve reduction of force to a common collective ceiling of 700,000 ground troops or 900,000 ground and air units combined for each side.
MX (MISSILE EXPERIMENTAL):	A new US ICBM developed to replace the increasingly vulnerable ICBM force and designed to fit a mobile mode.
NATIONAL TECHNICAL MEANS: (NTM)	Assets which are under national control for monitoring compliance with the provision of an agreement. NTM include photographic reconnaisance satellites aircraft-based systems (such as radars and optical systems, as well as sea and ground-based systems such as radars and antennas for collecting telemetry).
REAR-REAL TIME (WARNING):	Delay caused by automated processing and display, between the occurrence of an event and reception of the data at some other location.
NIGHT/ADVERSE WEATHER:	Technological capabilities permitting devices or vehicles so equipped to operate in the dark or in non-clear daylight conditions.
NON-CIRCUMVENTION:	SALT II provides that each party undertakes not to circumvent the provisions of this treaty through any other state or states or in any other manner. This provision simply makes explicit the inherent obligation any state assumes when party to an international agreement not to circumvent the provisions of that agreement. This provision will not affect existing pattern of collaboration and cooperation with our allies, including cooperation in moderization of allied forces.
NORTH ATLANTIC TREATY ORGANIZATION NATO:	An organization, also known as the Atlantic Alliance, consisting of the signatories of the North Atlantic Treaty. Present members are Belguim, United Kingdom, Canada, Denmark, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Turkey, West Germany, and the US. France signed the Treaty but is no longer an effective member.
NUCLEAR AIRBURST:	The explosion of a nuclear weapon in the air, at height greater than the maximum radius of the fireball.

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NUCLEAR DAMAGE ASSESSMENT:	The determination of the damage effect to the population, forces and resources resulting from actual nuclear attack. It is performed during the transattack and post-attack periods. It does not include the functions of evaluating the operational significance of nuclear damage assessments.
NUCLEAR DETONATION:	An explosion resulting from fission and/or fusion reductions in nuclear materials, such as that from a nuclear weapon.
NUCLEAR RADIATION:	Particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from the weapons standpoint, are alpha and beta paticles, gamma rays, and neutrons.
NUCLEAR SURFACE BURST:	An explosion of a nuclear weapon at the surface of land or water; or above the surface, at a height less than the maximum radius of the fireball.
NUCLEAR WEAPON:	A device in which the explosion results from the energy released by reactions involving atomic nuclei, either fission or fusion, or both.
NUCLEAR YIELD:	The energy released in the detonation of a nuclear weapon, measured in terms of kilotons or megatons of trinitrotoluene required to produce the same energy release. Yields are categorized as: Very Low - less than 1 kiloton; Low - 1 kiloton to 10 kilotons; Medium - over 10 kilotons to 50 kilotons; High - over 50 kilotons to 500 kilotons; Very High - over 500 kilotons.
OBSERVABLE DIFFERENCES:	See EXTERNALLY OBSERVABLE DIFFERENCES.
OPTICAL SCENE MATCHING CORREL-ATION:	A form of terminal guidance on missles which can distinguish the target from ground clutter.
OPTIMUM HEIGHT:	The height of an explosive which will produce the maximum effect against a given target.
ORBITAL (BOMB) INJECTION :	The process of providing a space vehicle with sufficent velocity to establish an orbit.
OVER PRESSURE:	The pressure resulting from the blast wave of an explosion. It is referred to as "positive" when it exceeds atmospheric pressure and "negative" during the passage of the wave when resulting pressures are less than atmospheric pressure.

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PASSIVE DEFENSE:	Measures taken to reduce the probability of, and to minimize the effects of, damage caused by hostile action without the intention of taking the initiative.
PASSIVE ELECTRONIC COUNTER-MEASURES	ECM without active transmission by the originator, such as intercept search for enemy electronic emissions and tactical evasion (measures taken to impede detection and tracking by the enemy).
PASSIVE HOMING GUIDANCE:	A system of homing guidance wherein the receiver in the missile utilizes radiations from the target.
PAYLOAD:	Weapons and pentration aids carried by a delivery vehicle. In the case of a ballistic missile, the RV(s) and antiballistic missile penetration aids placed on ballistic trajectories by the main propulsion stages or the PBV; in the case of a bomber, those bombs, missiles, or penaids carried internally or attached to the wing or fuselage.
PEAK OVERPRESSURE:	The maximum value of overpressure at a given location which is generally experienced at the instant the shock (or blast) wave reaches that location.
PENETRATION AIDS (ACTIVE & PASSIVE):	Devices employed by offensive weapon systems, such as ballistic missiles and bombers, to increase the probability of penetrating enemy defenses. They are frequently designed to simulate or to mask an aircraft or ballistic missile warhead in order to mislead enemy radar and/or divert defensive antiaricraft or antimissile fire.
PERIGEE:	The point at which a satellite orbit is the least distance from the center of the gravitational field of the controlling body or bodies.
POST-BOOST VEHICLE (PBV):	Often referred to as a "bus", the PBV is that part of a missile which carries the reentry and thrust devices for altering the ballistic flight path so that the reentry vehicles can be dispensed sequentially toward different targets (MIRVs). Ballistic missiles with single RV's also might use a PBV to increase the accuracy of the RV by placing it more precisely into the desired trajectory.
PRE-LAUNCH SURVIVABILITY:	The probability that a delivery and/or launch vehicle will survive an enemy attack under an established condition of warning.
PRE-EMPTIVE ATTACK:	An attack initiated on the basis of incontrovertible evidence that an enemy attack is immenent.
PRE-POSITION	To place military units, equipment or supplies

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at or near the point of planned use or at a designated location to reduce reaction time and to insure timely support of a specific force during initial phases of an operation; (PONCUS).

PROBABILITY OF DAMAGE: The probability that damage will occur to a target expressed as a percentage or as a decimal.

PROCUREMENT: The process of obtaining personnel, service, supplies and equipment.

PRODUCTION LEAD TIME: The time interval between the placement of a contract and receipt into the supply system of material purchased. Two entries are provided: a. initial - the time interval if the item is not under production as of the date of contract placement. b. reorder - the time interval if the item is under production as of the date of contract placement.

PROJECTILE: An object projected by an applied exterior force and continuing in motion, as a bullet, bomb, applied to rockets and to guided missiles.

PROLIFERATION (NUCLEAR WEAPONS): The process by which one nation after another comes into possession of, or into the right to determine the use of nuclear weapons.

PROPELLANT: That which provides the energy required for propelling a projectile. Specifically, an explosive charge for propelling a bullet, shell or the like; also a fuel, either solid or liquid, for propelling a rocket or missile.

PROPULSION TECHNOLOGY: Technology related to: 1) reaction propulsion: propulsion system in which a forward motion or thrust is produced by the expulsion of propullant gases through nozzles or venturi, generally longitudinally opposed to the intended line of travel; 2) jet propulsion: reaction propulsion in which the propulsion unit obtains oxygen from the air as distinguished from rocket propulsion in which the unit carries its own oxygen producing material. In connection with aircraft propulsion, the term refers to a gasline or other fuel turbine jet unit which discharges hot gases through a tailpipe and a nozzle, affording a thrust which propels the aircraft.

PROTOCOL: The SALT II agreement consists of three parts: a Treaty which will last through 1985, a Protocol which will last through 1981, and a Joint Statement of Principles and Basic Guidance for Subsequent

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Negotiations on the Limitation of Strategic Arms. The Protocol establishes temporary limitations on mobile ICBM launchers, ground and sea -launched cruise missiles, and ASBM's.

QUALITATIVE LIMITATION: Restrictions on capabilities of a weapon system as distinct from quantitative limits (e.g., on numbers of strategic delivery vehicles). In SALT II, such qualitative limits include, inter alia, a prohibition on more than one new type of ICBM for each side, restrictions on missile launch-weight and throw-weight, and limitations on the number of reentry vehicles a missile may carry.

QUANTITATIVE LIMITATION: Numerical limits on the number of weapons systems in certain categories, as distinct from qualitative limits on weapons capabilities. For the purposes of SALT II, such limitations include the various aggregate limits.

RADAR: Radio Detection And Ranging equipment that determines the distance and usually the direction of objects by transmission and return of electromagnetic energy.

RADIAC: A term used to designate various types of radiological measuring instruments or equipment. This term is derived from the words Radioactivity Detection, Indication And Computation and is normally used as an adjective.

RADIATION DOSE: The total amount of ionizing radiation absorbed by material or tissues, commonly expressed in rads.

RADIUS OF ACTION: The maximum distance a ship, aircraft or vehicle can travel away from its base along a given course with normal combat load and return without refueling allowing for all safety and operating factors.

RAMJET A jet propulsion engine containing neither compression nor turbine, which depends for it operation on the air compression accomplished by the forward motion of the engine.

RANGE: 1. The distance between any given point and an object or target. 2. Extent or distance limiting the operation or action of somothing, such as the range of an aircraft, ship or gun. 3. The distance which can be covered over a hard surface by a ground vehicle, with its ratad payload, using the fuel in its tank and in cans normally carried as part of the ground vehicle equipment. 4. Area equippad for pratice in shooting at targets.

RAPID RELOAD CAPABILITY: The capability of a launcher to fire a second missile within a short period of time after an initial missile firing.

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REACTION TIME: 1. The elapsed time between the initiation of an action and the required response. 2. The time required between the receipt of an order directing an operation and the arrival of the initial element of the force concerned in the designated area.

REAL-TIME: The absence of delay, except for the time required for the transmission by electromagnetic energy, between the occurrence of an event or the transmission of data, and the knowledge of the event, or reception of the data at some other location.

RECONNAISSANCE: A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy; or to secure data concerning the meteorological, hydrographic or geographic characteristics of a particular area.

REDUCED BLAST/ENHANCED RADIATION WEAPON (RB/ER): A nuclear weapon designed to produce significantly more and/or higher energy output(s) of neutron, x-ray, gamma rays or a combination thereof than a normal weapon of the same total yield.

REENTRY VEHICLE (RV): That portion of a ballistic missile which carries the nuclear warhead. It is called a reentry vehicle because it reenters the earth's atmosphere in the terminal portion of the missile trajectory.

RESIDUAL RADIATION: Nuclear radiation caused by fallout, radioactive material dispersed artificially, or irradiation which results from a nuclear explosion and persists longer than one minute after burst.

ROCKET LAUNCHER: Device such as a barrel, tube, rail or platform from which rockets and projected.

ROENTGEN: A unit of exposure dose of gamma (or X-) radiation.

SAFEGUARD: A ballistic missile defense primarily designed to protect our land-based retaliatory forces against direct attack, defend the American people against a nuclear attack, and protect the United States against a possible accidential launch or small attack. The principal subsystems are the Sprint and Spartan missiles, Missile Site Radar, Perimeter Acquisition Radar, and the Data Processing System.

SEA CONTROL OPERATIONS: The employment of naval forces, supported by land and air forces, as appropriate, to achieve military objectives in vital sea areas. Such operations include destruction of enemy naval forces, suppression of

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enemy sea commerce, protection of vital sea lanes, and establishment of local military superiority in areas of naval operations.

SECOND-STRIKE: The first counter blow of a war. Generally associated with nuclear operations.

SENSOR: A technical means to extend man's natural senses; equipment which detects and indicates terrain configuration, the presence of military targets, and other natural and manmade objects and activities by means of energy emitted or reflected by such targets or objects. The energy may be nuclear, electromagnetic, including the visible and invisible portions of the spectrum, chemical, biological, thermal, or mechanical, including sound, blast, and earth vibration.

SHOCK WAVE: The continuously propagated pressure formed by the blast from an explosion in air by the air blast, underwater by the water blast and underground by the earth blast.

SIDE LOOKING AIRBORNE RADAR (SLAR): An airborne radar, viewing at right angles to the axis of the presentation of terrain or moving targets.

SLANT RANGE: 1. The line of sight distance between two points not at the same elevation.
2. Distance in a straight line from the center of a burst of a weapon at the instant of detonation (zero point) to a target.
3. Distance in a straight line from a gun, point of observation, or radar set to a target, especially an air target.

SOFTWARE: A set of computer programs, procedures, rule and possibly associated documentation concerned with the operation of a data processing system, e.g., compilers, library routines, manuals, circuit diagrams.

SONAR: A sonic device used primarily for the detection and location of underwater objects. (This term is devived from the words "Sound Navigation And Ranging")

SSBN: See SUBMARINE.

STANDOFF: 1. As pertains to shaped charge ammunition: the distance of spacing between the base of the liner and the target at the time of initiation.
2. The desirable characteristic of a weapon system that permits the attacking aircraft to launch an attack on the target at a safe distance, usually outside the range of counterfire.

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STRATEGIC AIR WARFARE:	Air combat and supporting operations designed to effect, through the systematic application of force to a selected series of vital targets, the progressive destruction and disintegration of the enemy's warmaking capacity to a point where he no longer retains the ability or the will to wage war. Vital targets may include key manufacturing systems, sources of raw materials, critical material, stockpiles, power systems, transportation systems, communication facilities, concentrations of uncommitted elements of enemy armed forces, key agricultural areas, and other such target systems.
STRATEGIC INTELLIGENCE:	Intelligence which is required for the formation of policy and military plans at national and international levels.
STRATEGIC STABILITY:	The maintenance as far as possible of conditions such that neither the US nor the USSR would feel compelled to use its nuclear forces. (See ARMS STABILITY).
STRATEGIC WARNING:	A notification that enemy-initiated hostilities may be imminent. This notification may be received from minutes to hours to days or longer, prior to the initiation of hostilities.
STRATEGY:	The art and science of developing and using political economic, psychological and military forces as necessary during peace and war, to afford the maximum support to polices, in order to increase the probabilities and favorable consequences of victory and to lessen the chances of defeat.
SUB-KILOTON WEAPON:	A nuclear weapon producing a yield below one kiloton.
SUBMARINE (SSBN; SSB; SSN; SS; SSG; SSGN):	A warship designed for operations under the surface of the seas. Nuclear powered submarines contain the letter designation "N." USS nuclear-powered submarines which carry SLBMs are designated "SSBN." The US has 41 operational SSBNs with 16 launch tubes each; the TRIDENT SSBns will have 24 tubes. Soviet SSBNs include the H, Y, and D classes. Attack submarines, designated for launching cruise missiles are designated "SSGN" or "SSG" and include the Soviet S, W, F & C class submarines The Soviet long-range, diesel-powerud ballistic missile submarines (Golf-class) are designated SSB.
SURFACE-TO-AIR MISSILE (SAM):	A surface-launched missile designed to operate against a target above the surface.
SURFACE-TO-SURFACE MISSILE (SSM):	A surface-launched missile designed to operate a target on the surface.

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SURVEILLANCE:	The systematic observation of aerospace, surface or subsurface areas, places, persons or things by visual, aural, electronic, photographic or other means.
TACTICAL:	Pertaining to the employment of units in combat or weapons designed for combat use.
TACTICAL NUCLEAR (FORCES, WEAPONS):	The use of nuclear weapons by land, sea or air forces against opposing forces, supporting installations or facilities, in support of operations, which contribute to the accomplishment of a military mission of limited scope, or in support of the military commander's scheme of maneuver, usually limited to the area of military operations.
TARGET ACQUISITION:	1. The detection, identification and location of a target in sufficient detail to permit the effective employment of weapons. 2. Process of positioning tracking apparatus of a weapon system so that a designated target is tracked.
TARGET DESIGNATION SYSTEM:	System for transmitting to one instrument the position of a target which has been located by another instrument.
TELEMETRY:	Refers to data, transmitted by radio to the personnel conducting a weapons test, which monitor the functions and performance during the course of the test.
TERMINAL GUIDANCE:	The guidance applied to a missile between mid-course guidance and its arrival in the vicinity of the target.
THEATER:	The geographical area outside the continental United States for which a commander of a unified or specified command has been assigned military responsibility.
THERMONUCLEAR WEAPON:	A weapon in which very high temperatures are used to bring about the fusion of light nuclear such as those of hydrogen isotopes (e.g., deuterium and tritium) with the accompanying release of energy. The high temperatures required are obtained by means of an atomic (fussion) explosion.
THROW-WEIGHT:	Ballistic missile throw-weight is the useful weight which is placed on a trajectory toward the target by the boost or main propulsion stages of the missile. For the purposes of SALT II, throw-weight is defined as the sum of the weight of: • the RV or RV's; • any PBV or similar device for releasing or targeting one or more RV's; and • Any antiballistic missile penetration aids, including aids, including their release devices.

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TIME-OF-FLIGHT: The time in seconds from the instant a projectile leaves the muzzle of a weapon or a missile leaves its platform, to the instant it strikes or bursts.

TRANSPONDER: A transmitter-receiver capable of accepting the electronic challenge of an interrogator and automatically transmitting an appropriate reply.

TURBOJET ENGINE: A jet engine whose air is supplied by a turbine driven compressor, the turbine being activated by exhaust gases.

UNACCEPTABLE DAMAGE: Degrees of destruction anticipated from an enemy second strike, which is sufficient to deter a nuclear power from launching a first strike. The degree of damage which will deter a first strike is a function, in part, of national value preferences and economic considerations and is therefore difficult or impossible to predict.

VERIFICATION: The process of determining, to the extent necessary to adequately safeguard national security, that the other side is complying with an agreement. This process of judging adequacy takes into account the monitoring capabilities of existing and future intelligence collection systems and analysis techniques and the ability of the other side to evade detection if it should attempt to do so. This process also assesses the political and military significance of potential violations and the costs, risks, and gains to a side of cheating.

VULNERABILITY: 1. The susceptibility of a nation or military force to any action by any means through which its war potential or combat effectiveness may be reduced or its will to fight diminished.
2. The characteristics of a system which causes it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of effects in unnatural (manmade) hostile environment.

WARHEAD: The part of a missile, projectile, torpedo, rocket, or other munition which contains either the nuclear or the thermonuclear system, high explosive system, chemical or biological agents or inert materials intended to inflict damage.

WAR RESERVES War reserves are stocks of material amassed in peacetime to meet the increase in military requirements consequent upon an outbreak of war. War reserves are intended to provide the interim suport essential to sustain operations until resupply can be effected.

WEAPON SYSTEMS: A weapon and those components required for its operation. (The term is not precise unless specific parameters are established).

YIELD: The energy released in an explosion. The energy released in the detonation of a nuclear weapon is generally measured in terms of the kilotons (KT) or megatons (MT) of TNT required to produce the same energy release.

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ACRONYMS

AAW	Anti-Air Warfare
ABM	Anti-Ballistic Missile
ABRES	Advanced Ballistic Reentry Systems
ABRV	Advanced Ballistic Re-entry Vehicle
ACR	Acoustic-Research Center
ADCU	Alternative Detection and Control Unit
ADSP	Advanced Digital Signal Process
AFAP	Artillery-Fired Atomic Projectile
AFSATCOM	Air Force Satellite Communications
AIR	Acoustic Intercept Receiver
AIRS	Advanced Inertial Reference Sphere
AIS	Advanced Isotope Separation
ALBM	Air Launched Ballistic Missile
ALCM	Air-Launched Cruise Missile
ALCS	Airborne Launch Control System
ALL	Airborne Laser Laboratory
ALPS	Alternate Launch Point System
AMaRV	Advanced Maneuvering Re-entry Vehicle
AMP	Aircraft Modernization Program
ANMCC	Alternate National Military Command Center
AP	Armour Piercing
APC	Armored Personnel Carrier
ARC	Acoustic Research Center
ARMS	Anti-Radiation Missions
ASALM	Advanced Strategic Air-Launched Missile
ASAT	Anti-Satellite
ASBM	Air-to-Surface Ballistic Missile
ASW	Anti-Submarine Warfare
ATA	Advanced Test Accelerator
ATBM	Anti-Tactical Ballistic Missile
ATGM	Anti-Tank Guided Munition
ATP	Advanced Technology Program
AWACS	Airborne Warning and Control System
BDA	Bomb Damage Assessment
BMD	Ballistic Missile Defense
BMEWS	Ballistic Missile Early Warning System
BR/CW	Biological Research/Chemical Warfare
BTH	Beyond-the-Horizon
BWC	Biological Weapons Convention
CAAM	Conventional Airfield Attack Missile
C/B/D	Chemical/Biological/Defense
C/BDT	Chemical/Biological Defense Technology
C^3 or CCC	Command, Control, and Communication
C^3I or CCCI	Command, Control, Communications and Intelligence
CD	Conference on Disarmament
CEP	Circular Error Probable
CL	Chemical-Laser
CLGP	Cannon-Launched Guided Projectile
CMCA	Cruise Missile Carrier Aircraft
CMP	Counter Military Potential

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CONUS	Continental United States
CSCE	Conference on Security and Cooperation in Europe
CSEDS	Combat Systems Engineering Development Site
CTB	Comprehensive Test Ban
CW	Chemical Warfare
CY	Calunder Year
DARCOM	Development and Readiness Command
DARPA	Defense Advanced Research Projects Agency
DB	Decibels
DCT	Detection/Classification/Targeting
DCU	Detection Control Unit
DF	Deuterium Flouride
DOD	Department of Defense
DOE	Department of Energy
DPG	Dugway Proving Ground
DRE	Display Remoting Equipment
DSARC	Defense Systems Acquisition Review Council
DSPK	Double Shot Probability of Kill
DU	Depleted Uranium
ECCM	Electronic Counter-Counter Measure
ECM	Electronic Countar Measure
EDL	Electric Discharge Laser
ELF	Extremely Low Frequency
ELINT	Electronic Intelligance
EMCON	Emission Control
EMP	Electro-Magnetic Pulse
EMT	Equivalent Magatmorage
EP	Earth Penetrator
ERAM	Extended Range Anti Armor Mine
EUR	US European Command
FBM/IAP	Fleet Ballistic Missile/Improved Accuracy Program
FBMS	Fleet Ballistic Missile System
FBS	Forward Based Systems
FEBA	Forward Edge of the Battle Area
FLIR	Forward Looking Infrared
FMS	Foreign Military Sales
FOBS	Fractional Orbital Bombardment System
FRG	Federal Republic of Germany
FROD	Functionally Related Observable Difference
FROG	Free Rocket Over Ground
FUFO	Full Fusing Option
FY	Fiscal Year
GDL	Gas Dynamic Laser
GEODSS	Ground-based Electro-Optical Deep Space Surveillance
GIN	Greenland, Iceland, Norway
GIUK	Greenland, Iceland, United Kingdom
GLCM	Ground-Launched Cruise Missile
GPS	Global Positioning System
GSRS	General Support Rocket System

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HE	High Explosive
HEL	High Energy lasers
HELTADS	High Energy Laser Tactical Air Defense
HELWS	High Energy Laser Weapon System
HEU	High Enriched Uranium
HF	Hydro-Fluoride
HOB	Height Of Burst
HOE	Homing Overlay Experiment
IAEA	International Atomic Energy Agency
IAP	Improved Accuracy Program
ICBM	Intercontinental Ballistic Missile
IFF	Identification Friend or Foe
IHE	Insensitive High Explosives
IOC	Initial Operational Capability
IONDS	Integrated Operational Nuclear Detection System
IR	Infrared
IRBM	Intermediate Range Ballistic Missile
IRT	Intermediate Range Technology
ITV	Instrumented Test Vehicle
IVA	Intermediate Volatility Agent
JDT	Joint Draft Text
JSS	Joint Surveillance System
JTIDS	Joint Tactical Information Distribution System
KM	Kilometer
KT	Kiloton
LADARS	Laser Radars
LANT	Atlantic Command
LoAD	Low Altitude Defense
LOW/LUA	Launch on Warning/Launch Under Attack
LRTNF	Long Range Theater Nuclear Forces
LWIR	Long Wave Infrared
MAD	Mutual Assured Destruction
MAPS	Multiple Aim Point System
MaRV	Maneuvering Re-entry Vehicle
MBFR	Mutual and Balanced Force Reductions
MBT	Main Battle Tank
MCCS	Multiple Code Coded Switch
MECs	Main Evaluation Centers
MEV	Million Electron Volts
MHV	Miniature Homing Vehicle
MIRACL	Mid-Infrared Advanced Chemical Laser
MIRV	Multiple Independently Targeted Re-entry Vehicle
MLIS	Molecular Laser Isotope Separation
MOU	Memorandum Of Understanding
MPS	Multiple Protective Shelter
MRASM	Medium-Range Air-to-Surface Missile
MRBM	Medium Range Ballistic Missile
MRV	Multiple Re-entry Vehicle
MSC	Military Sealift Command

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MSOR	Maximum System Operational Range
MSR	Missile Site Radar
MTU	Mobile Test Unit
MX	Missile Experimental
NATO	North Atlantic Treaty Organization
NAVFACS	Naval Shore Facilities
NAVSTAR	Navigation Satellite Timing and Ranging
NCA	National Command Authority
NDS	Navigation Development Satellite
NGA	NATO Guidelines Area
NM	Nautical Mile
NMCC	National Military Command Center
NNK	Non-Nuclear Kill
NORAD	North American Air Defense
NPT	Non-Proliferation Treaty
NSWP	Non-Soviet Warsaw Pact
NTM	National Technical Means
NTS	Navigation Technology Satellite
NUDETS	US Nuclear Detonation Warning System
OAS	Offensive Avionics System
OD	Observable Difference
OSD	Office of the Secretary of Defense
OTH	Over-The-Horizon
OTH-B	Over-The-Horizon Backscatter
OTH-T	Over-The-Horizon Targeting
PAC	Pacific Command
PAL	Permissive Action Link
PAR	Perimeter Acquisition Radar
PB	Particle Beam
PBV	Post Boost Vehicle
PBW	Particle Beam Weapon
PGM	Precision Guided Munitions
PGRV	Precision Guided Re-entry Vehicle
PI/DE	Positive Identification/Discrimination Equipment
PLSS	Precision Location Strike System
PNE	Peaceful Nuclear Explosion
POL	Petroleum, Oil, Lubrication
PSI	Pounds Per Square Inch
PSP	Plasma Separation Process
RADAG	Radar Area Coorelation Guidance
RAM	Radar Absorbing Material
RB/ER	Reduced Blast/Enhanced Radiation
RDT&E	Research, Development, Test, and Evaluation
REM	Roentgen Equivalent Man
RF	Radio Frequency
RPV	Remotely Piloted Vehicle
RV	Re-entry Vehicle
SAC	Strategic Air Command
SALT	Strategic Arms Limitation Treaty
SAM	Surface-to-Air Missile
SATCOM	Satellite Communications

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SATRACK	Satellite Missile Tracking System
SAWS	Submarine Acoustic Warfare Systems Project
SCC	Special Consultative Committee
SCUD	Soviet Tactical Missile
SE/AA	Strategic Warning and Attack Systems
SF	Standard Fission
SIGINT	Signal Intelligence
SINS	Ships Inertial Navigation System
SLBM	Submarine Launched Ballistic Missile
SLCM	Sea-Launched Cruise Missile
SLFCS	Survivable Low Frequency Communication System
SLOC	Sea Lines of Communication
SLTDP	Special Laser Technology Development Program
SNDV	Strategic Nuclear Delivery Vehicle
SNM	Special Nuclear Materials
SOSUS	Sound Surveillance System
SOTAS	Stand-Off Target Acquisition System
SPA	SOSUS Probability Area
SRAM	Short-Range Attack Missile
SRAT	Short-Range Applied Technology Program
SRBM	Short-Range Ballistic Missile
SSBN	Submarine Ballistic Nuclear
SSN	Nuclear-Powered Attack Submarine
SSPK	Single Shot Probability of Kill
STP	Systems Technology Program
SURTASS	Surface Towed Array Sensor System
TACAMO	Take Charge and Move Out
TAK	Navy Cargo Ship
TASM	TOMAHAWK Anti-Ship Missile
TEL	Transporter-Erector-Launcher
TERCOM	Terrain Contour Matching
TLAM/C	TOMAHAWK Land-Attack Missile/Conventional
TLAM/N	TOMAHAWK Land-Attack Missile/Nuclear
TNF	Theater Nuclear Forces
TNW	Theater Nuclear War
TREE	Transient Radiation Effects on Electronics
TTBT	Threshold Test Ban Treaty
UE	Unit Equipped
USAF	Unied States Air Force
USG	United States Government
VLF	Very Low Frequency
V/STOL	Vertical/Short Takeoff and Landing
WAAM	Wide Area Antiarmor Munition
WIC	Warning Information Correlation
WP	Warsaw Pact
WWMCCS	Worldwide Military Command and Control System

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